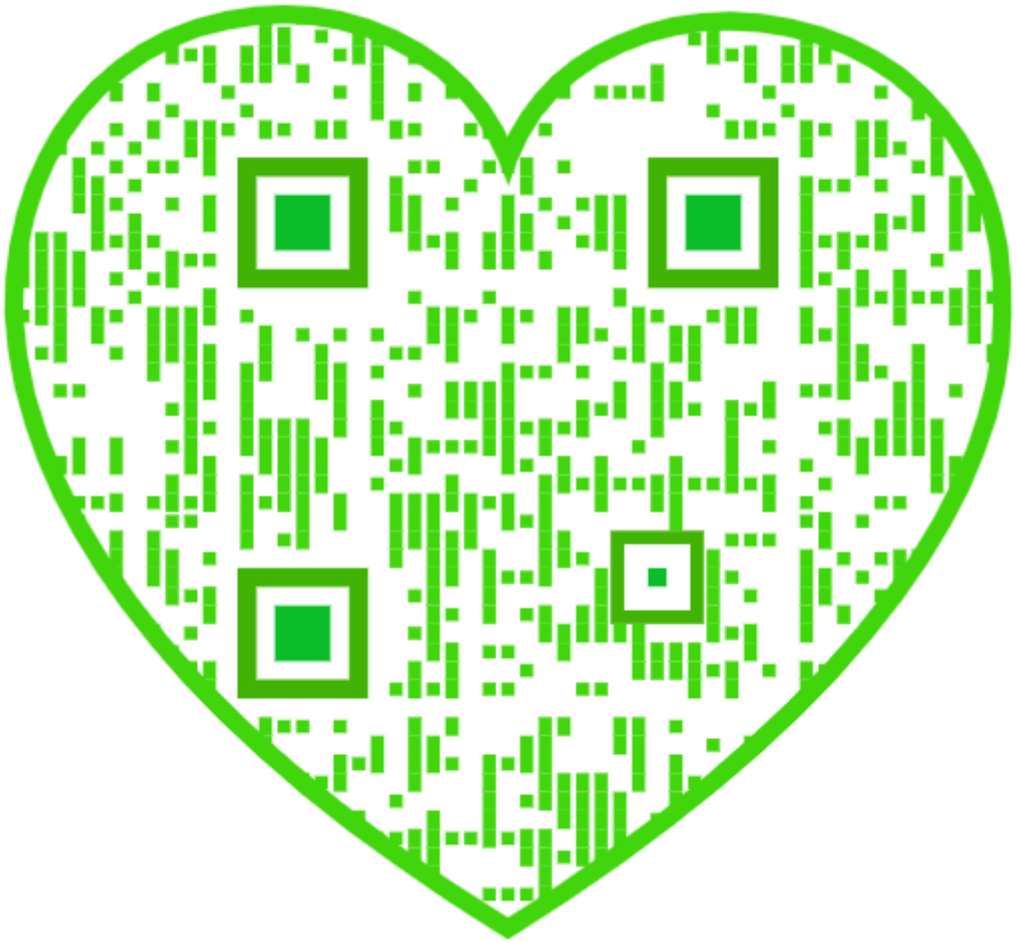

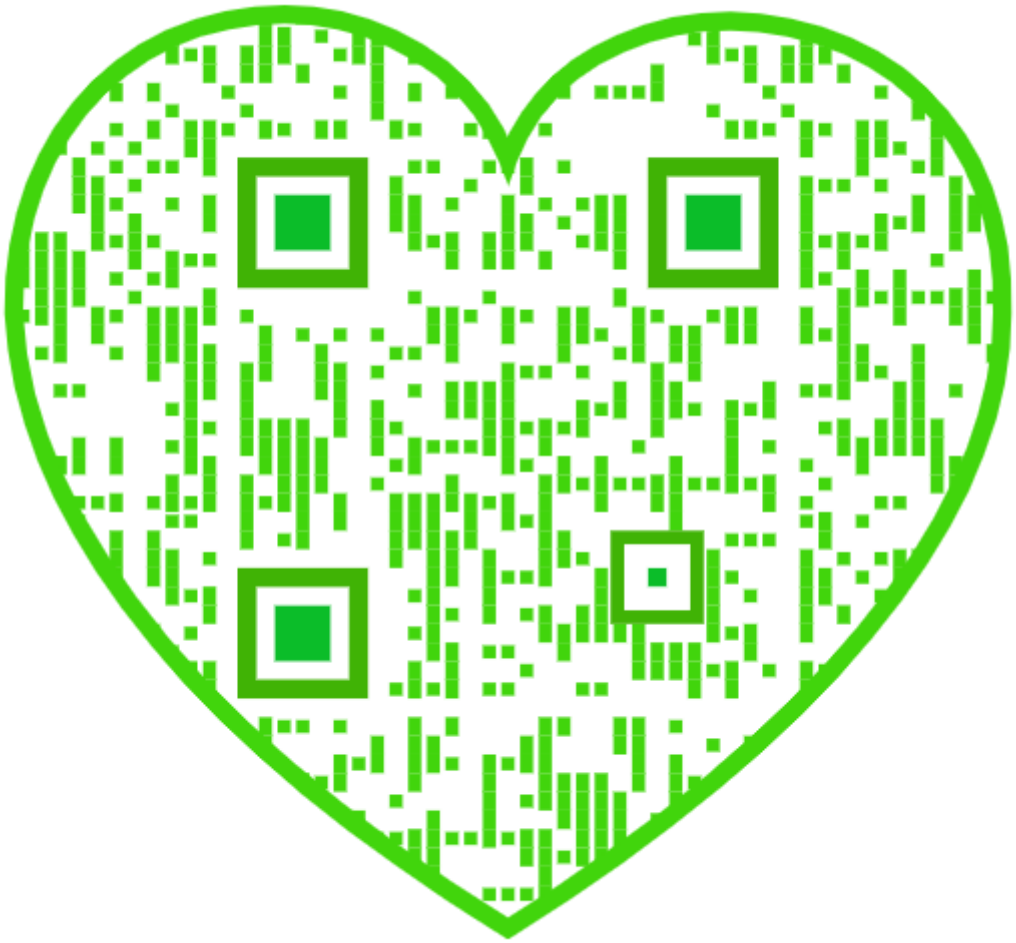

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The Veterinary Obstetrical Compendium

For the Farmer and Breeder of Live Stock.

A Practical Illustrated Treatise on the Delivery of Colts, Calves, Lambs, Pigs and Dogs; Including the Causes, Symptoms, Preventation and Treatment of the Diseases and Accidents Incidental to the Generative Organs of the Female Parent—also Diseases and Malformations of the Young Animals.

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WALES E. VAN AME,

FORT WAYNE, IND.

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REMARKS

TO THE BREEDER OF DOMESTICATED ANIMALS.

THE VETERINARY OBSTETRICAL COMPENDIUM is not limited to labor and the act of delivering of the young—certainly one of the most important, and yet difficult, of all animal functions; for it includes not only rules which should be followed in order to remove or remedy the material obstacles or accidents which may hinder the accomplishment of that act, but likewise embraces everything connected with the health and preservation of the female parent and the young creature while they are in the closest relations with each other before delivery, as well as for some time after their disjunction.

The functions of the Generative System are intimately related to and dependent upon each other—a failure or defect in one disturbing their relationship, and leading to sterility or barrenness or irregularity in reproduction. Everything connected with this subject, as well as that which terminates with natural or spontaneous labor has been included in this treatise, also the difficulties attending labor and delivery, whether they depend upon the mother, or the young creature, or upon both, with the means for overcoming them, and the accidents which may complicate difficult labor and delivery. The maladies to which the parent is most exposed after delivery, and their medical and surgical treatment, as well as the condition, diseases, malformations and treatment of the young animal after birth and up to the time of weaning.

THE VETERINARY OBSTETRICAL COMPENDIUM is illustrated throughout with lifelike illustrations, and we consider this work of great practical value, as it is written in the plainest language, devoid of all technical terms, so all who read can readily understand it. The necessity for such a guid has been felt more particularly by the Stock Raiser and Farmer; for only too frequently have they had to rely upon their own resources, and to painfully acquire, at their own expense, that knowledge on the subject which is so thoroughly illustrated and explained in this Veterinary Obstetrical Compendium. For a want of knowledge in giving the proper assistance to their live stock at the critical time, the loss to the Stock Owner amounts to an enormous sum annually.

We need not allude to the immense importance of this branch of Veterinary Science from an economical point of view. The ever-increasing value of nearly all the domesticated animals, and the necessity for their multiplication to supply the demands and meet the requirements of a widely extending and rapidly-progressive civilization, render everything connected with their reproduction of great moment and concern; while to assist creatures in the pangs of protracted and difficult labor and delivery, and to prevent or abbreviate suffering—in all probability to preserve their life —previous to, during, or subsequent to the occurence of this physiological act, is no less a duty than it should be a source of satisfaction to the Stock Raiser.

When we consider the vast and yearly increasing amount of animal wealth we possess, the great skill, attention and expense bestowed on the perfecting of the most important of the domesticated animals, which are daily becoming more essential factors in our progressive civilization, it might therefore be stated that everything relating to the reproduction and rearing of these creatures must be of great interest not only to Breeders and Stock Raisers,

but to the entire community. Great loss may be, and far too often is, quickly sustained among animals during the period which the female who has conceived carries the young in her womb up to the time of delivery, during delivery, and after delivery. A treatise which might aid, to however small extent, in pointing out how these losses may be averted or remedied, must surely, then, prove a welcome boon to those who are engaged in breeding and raising animals.

Veterinary Obstetrical Compendium.

FEMALE GENERATIVE ORGANS.

The genital organs of the female are much more complicated than those of the male, because of the far greater share they take in the process of generation. They are usually described, according to their situation, as external and internal.

These organs may be enumerated as follows: The external organs consist of the vulva and udder (mammae), the internal organs of the vagina, womb, Fallopian tubes, and ovaries. These organs will be described in the above mentioned order.

EXTERNAL ORGANS OF GENERATION.

THE VULVA OF THE MARE.

THE VULVA is the external orifice of the generative organs, which appears as a vertically elongated slit, situated beneath the anus, and between the posterior margins of the two hind quarters. It presents two thick lips (labia), and two angles (Commissures), externally; and internally it forms a cavity which is continuous with that of the vagina.

THE LIPS (labiae vulvae) are usually in contact, and they, with the opening which separates them (rimae vulva), vary in size according to age and condition. They are

slightly prominent and thick, being composed of firm, flexible, and elastic tissue, which is covered with a fine, smooth skin destitute of hair. Internally, they are covered by mucous membrane, a continuation of that lining the vagina, and which is constantly lubricated by a greasy mucus possessing a special odor, according to the species of the animal; on the free border of the vulva this membrane and the skin meet.

THE ANGLES situated at the junction of the lips

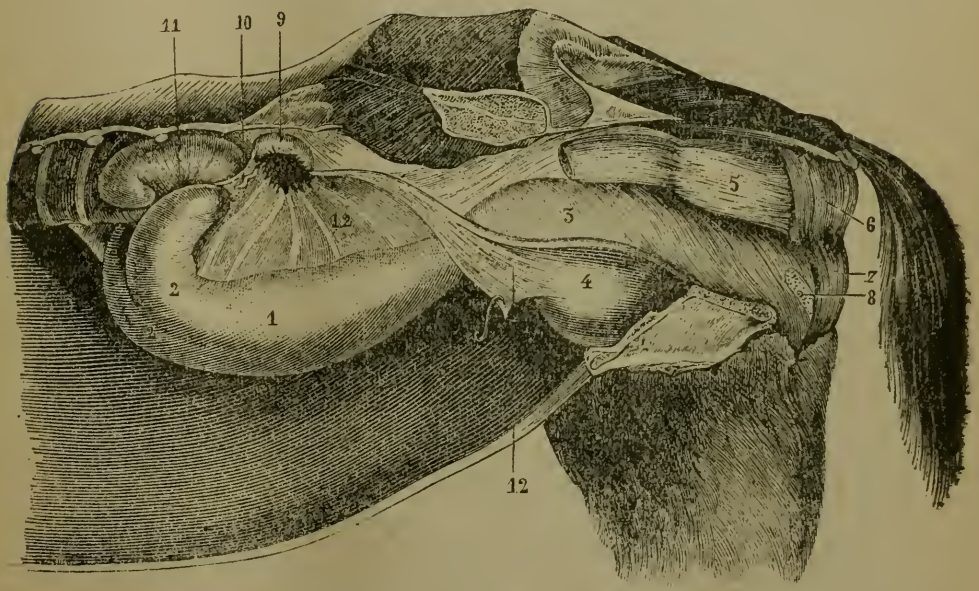

Fig. 1.

THE GENERATIVE ORGANS OF THE MARE.

1, Body of the Womb; 2, 2, Horn of the Womb; 3, Vagina; 4, Bladder; 5, Rectum; 6, Round Muscle of the Anus; 7, Constrictor Muscle of the Vulva; 8, Bulb of Vagina; 9, Ovary and Fringe-like prolongations (Fimbriae) of Fallopian Tube; 10, Fallopian Tube; 11, Kidney; 12, 12, Broad Ligament.

above and below are the two angles. The upper angle (superior commissure) is situated close to the anus, from which it is only separated by a narrow space—the (perinaeum). It is very angular. The lower angle (inferior commissure) is obtuse, rounded and more voluminous; it

lodges the clitoris which is a small organ, from two to three inches in length; its free extremity is enveloped in a mucous cap, which is plicated in different directions; and towards the center of this organ is found a cavity containing sebaceous matter, and which represents that in the extremity of the male penis. In every respect the clitoris resembles that organ, having a fibrous frame-work, erectile tissue, vessels, and a pair of muscles, the (erectores clitoridis). This organ is more especially the seat of venereal excitation during sexual intercourse (coition). It is present in all the domesticated female animals, and is frequently erected while they are in "heat," as well as when in the act of copulation. It is abundantly supplied with nerves, which endow it with most acute sensibility.

Toward the termination of pregnancy, the lips or labia becomes tumified and soft, the lower angle descends, the vulvar opening is enlarged, and from it is discharged a quantity of tenacious stringy mucus. In ordinary circumstances the vulva is retracted, and with Mares which have foaled several times the lips usually exhibit as many wrinkles or folds as parturition has been frequent.

DIFFERENCES IN THE VULVA OF OTHER ANIMALS.

COW.

In the Cow the lips of the vulva are larger, softer, and thicker than in the Mare, and the lower angle which is prolonged into a curved peak, is furnished with a tuft of hair. The clitoris is longer, and more tortuous and slender than in the Mare. The same changes occur in the vulva of the Cow as in the Mare during heat, and towards the termination of pregnancy; the mucus secretion of the vagina is more abundant in the Cow, however, and persists longer.

SHEEP.

In the Sheep which has not copulated, a filamentary band, stretching across the constriction between the urinary-genital canal and the vagina, represents the hymen. And the clitoris protrudes immediately within the peak of the vulva.

PIG.

In the Pig, the upper angle of the vulva is still more acute and pointed than in the Cow and Ruminants in general. The clitoris is comparatively small.

BITCH AND CAT.

In the Bitch the vulva is triangular, and the lower angle is acute. The clitoris is a small tubercle. In the Cat a small cartilage or bone exists in the clitoris; this is not found in any of the other domesticated animals.

THE PERINAEUM.

THE PERINAEUM is the name given to the space between the upper angle of the vulva and the lower margin of the anus. Its length varies in different species, and in different sized animals of the same species; but it is shorter in creatures which have produced young than in those which have not. Externally it presents a smooth, fine, and very elastic skin, with the vertical prominent line passing down its middle—called the 'raphe," beneath this are fatty tissue, various muscles, bloodvessels, and nerves.

THE BULB.

The internal limits of the vulva are defined by the bulb, which forms a marked prominence in early life, but tends to disappear in relaxed folds after the animal has brought forth young several times. The dimensions of this aperture are rather adapted for the passage of the young than the

penis; though its narrowness is sometimes an obstacle to the delivery of the young. The head, body or limbs of the young are at times arrested at the upper angle, which they so distend as to threaten laceration of the perinaeum. In emaciated animals, and particularly Mares, the vulva is deeply retracted, and consequently disposes them to be injured in this region during copulation, by the accidental introduction of the male organ into the anus—the mechanical action of which damages, and may even rupture, the rectum, which occurrence has terminated in the death of Mares.

THE UDDER (MAMMÆ) OF THE MARE.

THE UDDER is composed of glands destined to secrete the fluid—milk—which is to nourish the young animal for some time after birth. In early life the udder is rudimentary, but becomes developed with age, and attains its full dimension when the female is capable of reproduction; and especially at the full period of gestation, when its function is about to be carried on actively. After the delivery of the young, the largest development of the udder is reached, and when the young creature has completed its term of sucking, the udder becomes inactive and diminishes considerably in size. The Mare has two udders, which are placed beside each other, about nine inches in front of the vulva, where they take the place of the scrotum in the male. Externally they appear as two hemispherical masses, separated by a shallow furrow; each has in its center a conical, slightly flattened prolongation named the teat or nipple, which is perforated by several orifices from which the milk escapes, and by which the young creature obtains that fluid by suction. The glands of the udders are retained in their position by the fine, thin skin covering them, which is destitute of

hair at the extremity of the teats, though elsewhere provided with a soft, short down.

The milk reservoirs (galactophorous sinuses) are situated slightly above the base of the teat, and are generally two in number—one in front, the other behind; though there are sometimes three, and even four. These reservoirs nearly always communicate with each other, and are prolonged into the teat by a corresponding number of terminal and independent excretory canals, whose orifices are always very narrow, and are seen at the free extremity of the teat, which is obtuse and rounded. These excretory canals are much wider at the base of the teat than at the extremity; the orifices are about a line apart, and the canal and orifices are lined by a fine membrane which is continuous with the skin. The length of the teats varies with use.

MODIFICATIONS OF THE UDDER AT PUBERTY AND BEFORE PARTURITION IN THE MARE.

In the young and virgin Mare, the udders are hard and can scarcely be perceived; and their dimensions are not much increased in those which have had only one or two foals, though the teats are usually larger than before. When they have borne several foals, the udder continues somewhat enlarged and pendulous. At the termination of gestation, the udder is greatly increased in size, and instead of its being soft to the touch it now feels firm. Shortly before the delivery of the young (parturition) the secretion of milk commences, and soon after that event the glandular cavities become fully distended, and assume their maximum dimensions, which are maintained, with slight variations, during the entire period of lactation. When this period is terminated, the secretion gradually ceases, and the gland

again assumes its quiescent condition, and nearly its ordinary size.

DIFFERENCE IN OTHER ANIMALS.

COW.

In the Cow, as in the Mare, although developed in a single fibrous capsule or sac, is made up of two quite distinct glands—or "quarters," as they are generally termed—and which can be seen, or felt, by a slight depression.

Fig. 2.

SECTION OF UDDER OF COW.

a, Front Quarter; b, Back Quarter; g, Septum or Dividing Line Between the Quarters; c, c, Section of the Milk Ducts; d, d, Milk Cistern (Lactiferous Sinus); e, e, Orifice of the Teat; f, Large Lymph Gland in the Back Quarter.

Each gland has its corresponding teat, much more developed than that of the Mare. The Cow really possesses four udders and four teats. In the center and at the base of each teat, there is a single large cavity, which is the general confluent of all the milk ducts, and opens externally through the teat by a single excretory canal. This canal is

widest at its commencement, and narrow at its termination at the end of the teat. The walls of the teats are very thick, elastic, and retractile. Not infrequently there are found behind the four teats one or two rudimentary teats, which are generally imperforate; though in very rare instances they have been observed to be perforated and to yield milk.

The teats of the Cow are generally two and a half to three and a half inches in length; this length varies according as the animal has reared a large or small number of calves. The two forward teats are generally the longest, and the corresponding quarters furnish more milk than the others. The muscle around the free extremity of the teat, pevents the passive escape of the milk from the orifices of the excretory ducts; for if a small cannula, scarcely larger than one of these ducts, be inserted slightly beyond the orifice, the milk immediately flows. And when the end of a teat has been wounded, or when the muscle of this part has been divided in the performance of some operation, there is no longer any obstacle to the emission of the milk.

In the Cow, the secretion of milk can be excited and maintained by regular milking, the only suspension occurring before the birth of another calf.

SHEEP AND GOAT.

In the Sheep and Goat there are only two udders, as in the Mare and Ass, but the formation is on the same plan as in the Cow. The udders are somewhat hemispherical and voluminous, particularly in the Goat, and each udder is provided with a single conical, well-detached teat. The cavity or milk reservoir of each teat is very large, the walls of the teat being thin; the milk reservoir is in some instances capable of containing nearly three ounces of milk.

PIG.

In the Pig the udders are ten or twelve in number, disposed by pairs in two parallel rows. They have not, as in

the larger animals, any milk reservoirs, the milk canals of each teat joining directly to form a variable number of excretory ducts, which open at the free extremity of the teat by from five to ten orifices. The udders of the Pig are scarcely perceptible while they are not active; but during lactation they form two series of well-developed eminences, divided on the middle line by a wide and deep furrow.

BITCH.

In the Bitch there are eight to ten udders, arranged as in the Pig.

FUNCTIONS OF THE UDDER.

The secretion of milk is the special function of the udder, and takes place in the caecal vesicles of the lobules The milk is conveyed from these into the milk ducts and milk reservoir, where it is stored until a certain period; this retention after a time distends the glands very much, and puts the elastic envelop greatly on the stretch; while the teats also increase in size, length and firmness. When this distention becomes excessive, it causes the animal uneasiness and pain, and if not relieved by natural or artificial means it may occasion mischief.

INTERNAL ORGANS OF GENERATION.

The internal or formative organs of generation are contained within the pelvis and abdomen, and comprise the VAGINA, WOMB (UTERUS), FALLOPIAN TUBES, and OVARIES.

THE VAGINA OF THE MARE.

THE VAGINA of the Mare is a canal which extends almost horizontally within the pelvic cavity, from the vulva to the womb. (Fig. 1, Sec. 3.) The dimensions of this

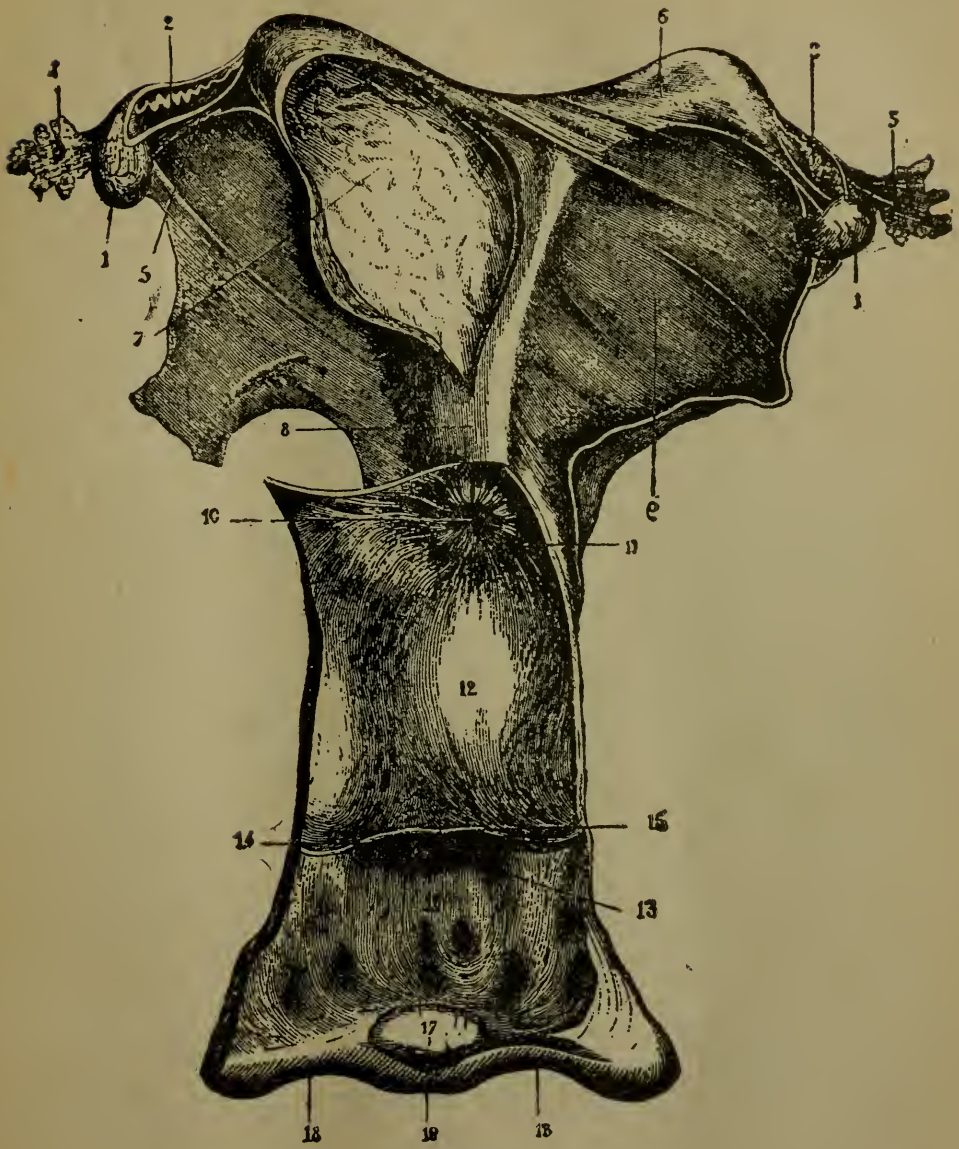

Fig. 3.

GENERATIVE ORGANS OF THE MARE: ISOLATED AND PARTLY OPENED.

1, 1, Ovaries; 2, 2, Fallopian Tubes; 3, Pavilion of the Tube, External Face; 4, Inner Face of Pavilion of the Tube; 5, Ligament of the Ovary; 6, Intact Horn of the Womb; 7, A Horn opened; 8, Body of the Womb, Upper Face; 9, Broad Ligament; 10, Neck of Womb; 11, Cul-de-sac of the Vagina; 12, Interior of the Vagina; 13, Opening of the Urethra (Urinary Meatus); 14,

Valve Closing over the Orifice of the Urethra; 15, a Vestige of the Hymen; 16, Interior of the Vulva; 17, Clitoris; 18, 18, Lips of the Vulva.

canal varies, and the walls are thin. Located above the vagina is the rectum (Fig. 1, Sec. 5), and below it is the bladder (Fig. 1, Sec. 4); on each side are the ureters and the walls of the pelvis, and back of it is found fatty and loose connective tissue. Usually the walls or sides of the vagina are in contact. Its length is variable, but in a full-sized Mare is generally about a foot long. Internally it is lined with a thin mucous membrane, which is always abundantly covered with mucus, which is disposed in longitudinal wrinkles or folds. These folds no doubt favor the dilitation of the canal during copulation, or during the passage of the young, and they are more conspicuous after several births. Along the lower face of the vagina extends a transverse ridge, which covers the orifice of the urethra (meatus). The membrane lining the vagina usually has a pale pink hue, but at the period of "heat" its color becomes heightened to a bright red, and its secretion is considerably increased. In youth the vagina is contracted. In old age it is much diminished. After copulation its dimensions are increased; in the third or fourth months of gestation in the larger animals, it becomts elongated from displacement of of the womb, which is carried farther forward into the abdominal cavity; toward the termination of gestation the length of the vagina is diminished as the womb acquires increased volume, and to such an extent does this occur that at the commencement of delivery or parturition, if the young creature (foetus) is large, and especially if there be two foetuses, the womb nearly or entirely fills the cavity of the vagina, and even in some instances thrusts it between the lips of the vulva or beyond.

DIFFERENCES IN THE VAGINA OF OTHER ANIMALS.

THE COW, SHEEP AND GOAT.

THE VAGINA in the Cow is longer and wider than in the Mare; the membrane is thicker, and is disposed in transverse folds, and at each side of the passage for a short distance, between the mucous and muscular layers, there exists a mucous canal that opens into the vulvar cavity, in front of, and at the side of the urethral opening (meatus urinarius). The uses of these canals or passages are unknown, but probably have some function during (foetal) unborn life. These canals are not present in the Sheep or Goat, and rarely in the Mare, which are usually known as the "canals of Gaertner."

PIG.

In the Pig the "canals of Gaertner" are not present; the folds of the membrane lining the vagina are longitudinal, and gradually subside towards the line of separation between the vagina and vulva. The vagina is from eight to ten inches long.

BITCH AND CAT.

There are no "Gaertner canals" in the Bitch or Cat. The vagina is of comparatively great length, and has longitudinal folds, which are interrupted by transverse folds. In both the Bitch and Cat the canal is wider towards the vulva than towards the womb, and the walls of the vagina are rendered very thick by white fibrous tissue.

THE WOMB, OR UTERUS.

THE WOMB OF THE MARE.

THE WOMB is an elongated muscular membranous sac which receives the ovum, and constitutes the receptacle for the nutrition, development, and, finally, after a certain

period, the expulsion of the young (foetus). It is situated in the sublumbar region of the abdomen, towards the inlet of the pelvic cavity. (Fig. 1, Sec. 1, and Fig. 3, Sec. 8.)

The womb consists of a body, two horns or two cornua, cervix or neck, cul-de-sac, broad or suspensory ligaments, os uteri or mouth of womb.

Fig. 4.

WOMB, FALLOPIAN TUBES, AND HORNS OF THE SHEEP.

a, Vagina; b, Mouth of the Womb; c, Body of Womb; e, e, Caruncles; f, Confluence of the Horns; g, Intact Horn; h, h, Fallopian Tubes or Oviducts; i, i, Fringe-like End of Fallopian Tube (Fimbriae); k, k, Ovaries; m, m, Broad Ligament; o, Horn Opened.

THE BODY of the womb is situated horizontally beneath the rectum, which is in contact with it after passing between the two horns; on each side of its upper external

face it receives the insertions of the wide ligaments; and its sides and front face are in contact with the intestines. Its lower surface is in contact with the bladder and the colon; while its anterior extremity is continuous with each horn, and the posterior is separated from the vagina by the constriction named the cervix, or neck of the womb.

THE HORN OR CORNUA (Fig. 1, Sec. 2, and Fig. 3, Sec. 6, 7) are cylindrical tubes, extending from the body of the womb in two upward curves—a convex curve, which is free, and a concave curve, to which the suspensory ligament is attached. Each horn has also a base which is a continuation of the body of the womb; and a summit, rounded into a cul-de-sac, which is turned upwards, and has at the bottom a small tubercle, the insertion of the oviduct.

THE BROAD OR SUSPENSORY LIGAMENTS (Fig. 1, Sec. 12, 12, and Fig. 3, Sec. 9) are two menbranеous bands which suspend the womb from the sublumbar region. These bands are larger in front than behind, and in shape are irregularly triangular; behind they are close to each other, but in front diverge like the sides of the letter V. The suspensory ligaments descend from the lower face of the lumbar region, and attach themselves, by their lower border, to the sides of the upper surface of the body and concave curve of the horn. Their front border is free and sustains the oviducts and ovaries.

THE CAVITY of the body of the womb communicates with the vagina by a narrow canal which traverses the neck of the womb, and is designated the canal of the cervix, or neck of the womb.

MOUTH OF THE WOMB (os uteri)—In the neck or cervix of the womb is the opening commonly termed the mouth of the womb. This opening leads from the vagina to the body of the womb. (Fig. 4, b.)

THE GLANDS located in the mucous membrane of the

womb, called utricular glands, are cylindrical in shape, and are situated very close to each other. They are long, slender and tortuous, and divide repeatedly in the deeper part of the mucous membrane. These glands do not exist at birth, and it is probable that they are only fully developed when sexual maturity is reached. At certain periods, as during "heat," they throw out a large quantity of very viscid, almost transparent, mucus. These glands are secreting structures, and during gestation play a most important part, becoming largely developed, and furnishing a thin, white, albuminous fluid, the so-called "uterine, or womb milk." This milky secretion comes more particular in contact with certain portions of the Foetal Placenta, or afterbirth, in which are curious pockets that act as receptacles for this milk, which is absorbed by the vessels on their walls.

DIFFERENCES IN THE WOMB OF OTHER ANIMALS.

COW.

THE WOMB of the Cow, with regard to its general disposition in the pelvic and abdominal cavities, does not offer any striking differences from that of the Mare, except that the body is short, and its interior space is much less than that of the Mare's womb. The neck of the womb of the Cow is from two and one-half to three and one-half inches in length; it is narrow, almost as firm as cartilage in texture, and irregular in shape. At an early age the neck is nearly circular in shape, and the body of the womb is so small that the neck and horns are close together, or joined to each other. Toward puberty, however, in all the larger domestic animals it becomes spindle shaped, and shows two lips, about two inches in length. These lips are composed of flattened, dense, transverse fibers and are pulpy to the touch. The

mouth of the womb, (os uteri), is located between these lips. A knowledge of the presence of the two lips of the neck of the womb, and also their position, is useful when explorations by hand are necessary in cases of inversion of the womb. The utricular glands are wider than in the Mare. The walls of the womb in the Cow are more dense than in any of the domesticated creatures.

SHEEP AND GOAT.

In the Sheep and Goat the disposition of the womb is similar to that of the Cow. The horns are relatively longer, and more pendent, and expand more gradually from the termination of the oviducts.

PIG.

In the Pig the horns of the womb are long, and float among the intestines, which they resemble; the body of the womb is very short. The mouth of the womb is marked by a series of narrow, close-set, longitudinal surfaces, but there is no lip projection into the vagina.

BITCH AND CAT.

In the Bitch and Cat the horns are very long and slender. The mouth of the womb is a smooth, thick and even prominence, larger almost than the body of the womb, which is short. It projects very markedly into the vagina.

FALLOPIAN TUBES, OR OVIDUCTS.

MARE.

THE FALLOPIAN TUBES, or OVIDUCTS, of the Mare (Fig. 1, Sec. 10, and Fig. 3, Sec. 2, 2), are two small, cylindrical, flexuous canals, about ten inches long, white in appearance, one of which is lodged in each broad ligament, between its serous layers and near its front border. Each tube commences at the extremity of the horn of the womb,

and terminates upon the ovaries. The calibre of this canal is small, and scarcely admits a thin straw at its middle portion, and it is still smaller at the womb extremity; as it approaches the ovary, it increases in width until it ends in the pavilion. (Fig. 3, Sec. 3.) This pavilion is fixed to the external side of the ovary, and its inner surface is marked by numerous narrow, close-set, minutely folded flat surfaces while its circumference is irregularly disposed into a number of unequal, fringe-like prolongations (Fig. 1, Sec. 9), which hang into the abdominal cavity.

THE FUNCTIONS OF THE FALLOPIAN TUBES, or OVIDUCTS.—Their function is to convey the formative agents furnished by the male in generation to the ovary in the first instance, and afterwards to transmit the impregnated ovum of the female to the womb or its horn; in this respect they are the excretory ducts of the ovaries.

DIFFERENCES IN OTHER ANIMALS.

COW, SHEEP AND GOAT.

In the Cow, Sheep and Goat, the fringe-like extremity of each tube is expanded (Fig. 4, i, i), and the duct itself forms three or four wavy folds, and is then continued along the walls of the wide ovarian capsule, or sac, to the extremity of the horn of the womb, which makes an abrupt curve to meet it.

PIG.

In the Pig the oviduct has few or no inflections, but its length is proportionately greater than in the other species The pavilion is wide and deep.

BITCH.

In the Bitch the tube is long and fine, passes in a wavy course around the front of the ovary to the womb. The

length of the tube is two and a half to three and a half inches.

THE OVARIES.

OVARIES OF THE MARE.

THE OVARIES (Fig. 3, Sec. 1, 1) are the essential organs of generation in the female, and analogous to the testicles of the male. The ovaries are two elongated egg-shaped bodies, loosely suspended in the sublumbar region, behind the Fallopian tubes and the kidneys, among the convolutions of the intestines, though sometimes their position is altered. The proper tissue or stroma of the ovary is solid

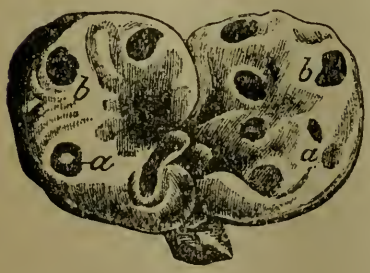

Fig. 5.
OVARY OPENED VERTICALLY.
a, a, b, b, Graafian Vesicles at different stages of development.

Fig. 6.
PORTION OF OVARY OF A PIG.
a, Point at which a ripe Ovum is about to escape; b, opening by which an Ovum has escaped.

and hard, and has a speckled-grey tint, and contains in its substance the Graafian vesicles or follicles. These Graafian vesicles (Fig. 5) are generally in various stages of development; the smallest are situated near the surface, and they increase in volume as they descend toward the deeper layer. When they have reached their full growth, they are filled with a transparent, citron-colored fluid, and form a more or less prominence on the surface of the ovary. The Graafian

vesicles are composed of an envelop or sac, the contents of less prominence on the surface of the ovary. The Graafian comes reddened by an admixture of blood when the sac ruptures. At the bottom of the sac, epithelium forms an aggregation, in the center of which exists the ovum. When the Graafian vesicle of the ovary ruptures and expels the ovum, the fringe-like ends of the Fallopian tube grasp the ovary, and receive the ovum, which they carry to the ovarian extremity of the canal.

THE OVUM, or Egg—Anatomists give the name ova to round vesicles containing a humor similar to the yolk of egg, which are situated in the ovaries of the female, and when fecundated by the male germ of generation constitutes the rudiments of the young (foetus). The ovum is a small cell surrounded by a thick, white membrane (zona pellucida); within this membrane is a granular layer, the yolk (or vitellus), the larger granules of which are superficial and compact, while internally it is a transparent albuminous fluid, in which are but few granules. Enclosed in this yolk, though nearer its circumference than center, is the nucleus—the female generative germ (vesicle of Purkinje), the most important portion of the ovum.

DIFFERENCES IN THE OVARIES OF OTHER ANIMALS.

COW, SHEEP AND GOAT.

In the Cow the ovaries are relatively smaller than in the Mare, but their form and structure are the same. The same arrangement is observable in the Sheep and Goat.

PIG.

In the Pig the ovaries are comparatively large, with an irregular aspect, due to the Graafian vesicles, which when well developed, project beyond the surface of the ovary.

instead of remaining within it. Each ovary is enclosed within a sac. The back or posterior wall of this sac appears to be formed by the wide and deep pavilion of the Fallopian tube.

BITCH AND CAT.

There is nothing particular to indicate in the ovaries of the Bitch and Cat, except that the ligaments suspending them to the spine are very short.

DEVELOPMENT OF THE OVARIES AND OVA.

The development of the OVARIES and OVA is very interesting. In the Mare the ovaries of the foetus are, when compared with the womb, of an immense size, and at six months are almost as large as in the adult. In aged animals they become shriveled, and it is not unusual in old Mares to find either one or both in an unhealthy condition. Not infrequently they are enlarged, and their fibrous envelop and proper tissue are much thickened. Sometimes the vesicles are greatly enlarged, and converted into cysts which contain a purulent fluid, secreted from their walls.

The Graafian vesicles are present in the ovary of the foetus, but they do not attain their full development until puberty; neither are they all present at birth, but are continually being developed. Until puberty there is no great activity apparent in the Graafian vesicles: but at this time the ovary becomes more vascular, and certain of these vesicles increase in volume. At the period of "rut" or "heat," one or more of the Graafian vesicles, according to the species of the animal, show evidence of increased vascularity and become distended; the ovisac thins at the most prominent part to which the ovum tends, and blood is extravasated into it; then, partly by absorption and partly by pressure, the coverings give way, and the ovum escapes outwards, and

is either received into the Fallopian tube for conveyance to the womb, or, which is very rare, fall into the cavity of the abdomen. After the rupture of a Graafian vesicle and the escape of the ovum, the cavity of the ovisac is filled with a clot of blood, while its walls are thickened and altered in color. In the Cow and Sheep the follicle has a brick-red color, and in the Pig it is a yellowish-brown; but gradually the clot of blood shrinks, loses its tint, and the cavity contracts; at the same time the walls of the ovaries become enlarged. By the time the succeeding ovisac with the ripening ovum has begun to protrude from the surface of the ovary, the old ovisac has lost its color, with much of its dimensions, and fallen inwards. This change, with collapse of the wall, depresses the scar of the aperture; and these successive shrinkings and scars (cicatrisations) of the ruptured ovisacs give the ovary a pitted and furrowed appearance in advanced life.

If the expelled ovum be not impregnated with the male germ of generation, the changes of the ovisac into the yellow convolute cavity, then into the depressed scar, occurs somewhat rapidly; but if impregnation takes place, the maturation of successional ova is delayed, and the first change in the ruptured ovisac goes on to a greater extent, and it rarely happens that the cavity is obliterated before full gestation. In the Mare the cavity becomes obliterated more rapidly than in the other domesticated animals, and it has not that deep yellow color observed in the Cow; but is of a darker, dull reddish-brown hue.

The number of ovisacs and ova which become matured at each "rut" or 'heat," depends upon the multiparity or uniparity of the species; in the Mare and Cow there is usually only one, in the Sheep and Goat one or two ,in the Pig from four to a dozen, and in the Bitch a variable number.

OBSTETRICAL PHYSIOLOGY.

REPRODUCTION.

Having described the situation, structure, and peculiarities of the external and internal organs of the female domesticated animals, we have now to inquire into their functions. Some of these functions have for their end the conception, development, and preservation of the young animal for a certain period, until it can maintain a more or less independent existence, when others of them are brought into play in order to place it in direct relation with the external world in the act of delivery (parturition), while others cease. But in order that generation should take place in the higher class of animals, it is necessary that the two sexes be placed in favorable relations with each other, as the essential of reproduction is the contact with, and action of the male fecundating fluid on, the ovum of the female. Nature has ordained that this creative act should be accomplished by engendering in these animals an instinctive, copulative, and irresistible desire at a certain stage of existence; which desire, continuing only for a brief period, is renewed after particular intervals, until the faculty of reproduction ultimately ceases.

The advent of the power of reproduction in the male and female sex of animals is very unequal among the various species, and is generally in relation to the duration of their existence—the creatures which are short-lived being capable of bringing forth young at an earlier period of life than those which enjoy a longer term.

Out of many thousands of ova furnished by the most prolific species, a comparatively limited number only find all the conditions favorable for their development.

GENERATION.

GENERATION is the act of procreating the species; (breeding.) The processes by which generation is accomplished are four; these are:

Copulation.—Sexual intercourse. Carnal union of the sexes.

Fecundation.—Act by which, in organized beings, the material furnished by the generative organs of the female unites with that prepared by those of the male, so that a new being results.

Gestation.—The time during which a female who has conceived carries the young (embryo) in her womb up to the time of delivery. Pregnancy.

Parturition.—Delivery, labor, birth, bearing young; expulsion of young at term. Act of delivery of the young (foetus) and its appendages; also the state during and immediately after delivery.

But gestation only takes place on the attainment of a certain age—that of puberty (the period of life at which animals become fitted to procreate)—that these sexual acts are in activity, and they continue so for a variable period, according to the species. During this time, ova from the ovaries, fecundated by the male seminal fluid, are received into the womb, and remain there for a regulated period, until they have become transformed into young creatures possessing certain physical attributes and resemblances to their parents. This is the gestation period, and is followed by that of parturition, when the young is born.

PUBERTY.

The generative organs of the domesticated female animals are, like those of the human female, only in a state of greatest activity during the prime of life; and the most notable characteristic of their functions is their periodicity. These functions lie dormant from birth until puberty, when,

somewhat suddenly, certain very marked modifications occur throughout the whole organism, but particularly in the generative organs of the male and female animals. In the male the testicles become more voluminous, and in some species they leave the abdominal cavity to be lodged in the scrotum; they also begin to secrete an abundance of a special fluid, called the "spermatic" or "seminal fluid," in which appear particles of a definite shape (spermatozoa) which are endowed with motion. The organ for the conveyance of this spermatic fluid to the female becomes more developed, and is capable of complete and frequent erection. In the female the udders enlarge, the ovaries are more vascular than before and the Graafian vesicles are more or less developed. The periodic escape of the ovum from the ovary then begins to be carried on, with all the distinctive peculiarities that attend it, and which it is to bear during the prolific period of life.

The age at which animals arrive at puberty or sexual maturity, is not only different in different species, but is influenced to some extent by the rapidity of their growth and the duration of their life. And it may be said that puberty is sooner attained in the female than in the male. It may also be affirmed that in the male the periodicity of the procreative manifestations is not so marked as in the female, the generative functions of the male being always more or less in activity.

The aptitude to procreate, though generally admitted as an indication of adult age, yet appears before animals have attained their full physical development, and is present in some creatures at a comparatively early period of life—depending upon climate, food, and other circumstances. The Pig may conceive when only four or five months old, or earlier; the Sheep and Goat at eight to twelve months: the Bitch at seven to ten months; the Cat at from eight months to a year, though it is usually in "heat" for

about ten days before it is a year old; the Cow at twelve to eighteen months, and the Mare at from twelve months to two years.

With regard to the period when procreation ceases in animals, there is not any reliable data on which to arrive at a trustworthy conclusion. The Mare has not ceased to breed after thirty years of age, and the Cow and Sheep have bred beyond twenty years. There are notes of Mares producing foals at twenty-eight, thirty-two, and thirty-eight years of age.

HEAT—MENSTRUATION, or (ŒSTRUM.)

The rutting, heat, oestrum, or venereal oestrum of animals is analogous to "menstruation" in woman, and marks the period of maturation in the ovarian ova or ovum, according to the species. This condition is intermittent or periodic, not continuous; it is characterized by a peculiar systemic excitement that usually continues for a somewhat definite period in the two sexes. In the male and female, but especially the female, the generative organs become more or less sensitive, and the secretions are increased. In the female there is a determination of blood to the ovaries, and changes take place in these which have already been described. The excitement in the generative apparatus reacts on the whole system, and produces a kind of fever or irritability in the animal; its sensibility is increased; the appetite is more or less in abeyance or capricious, and usually there is thirst; if the secretion of milk has been active, it now diminishes, and in the non-impregnated Bitch milk even appears in the udder; restlessness is a notable feature, and the movements betray the prevailing desire. There is an uncontrollable tendency to seek the opposite sex; with some animals the ordinary disposition becomes strangely per-

verted; and in others, again, certain physical changes accompany the sexual perturbation. The Mare is generally irritable or sluggish, and less able to sustain fatigue; the Cow frequently bellows and mounts other Cows, and if at pasture runs about with raised tail, and may even wander away in search of the Bull; the Sheep are less excitable, though it shows a change in its habits; the Sow grunts in a peculiar manner and becomes torpid, and manifests its amorous desires by mounting others; while the Bitch is still more demonstrative, and frequently runs about accompanied by a crowd of males, not returning home until her desires have been gratified.

Attempts at urination in the female are frequent, but only a small quantity of urine is passed, and with animals whose foot is not cloven there are oft-repeated movements of the clitoris and vulva, and an opaque white secretion, or even emissions of blood is ejected spasmodically by the vulva. Well-marked symptoms of hysteria have been observed in some Mares.

In other animals this ejection sometimes consists of a viscid, red-tinted fluid. In all it has a special and powerful odor, which attracts the males, and enables them to distinguish between the females which are in "rut" or "heat," and those which are not, as well as exciting in them the most ardent amatory desires.

The menstrual flow appears two or three days after the commencement of "rutting," and when this is most intense. The amount of blood does not exceed one or two ounces, and the coagulated clot of blood remains in the vagina until it is expelled with the urine. Not only is the existence of a menstrual discharge in animals a well-ascertained fact, but the ill effects of its retention have been recorded as occurring in both the Mare and Cow.

Seasons at which "heat" takes place.—It has been observed that "heat" usually takes place in the spring-time,

when food becomes plentiful, especially with Herbivorous animals. The Carnivora are in heat during winter. The Mare is usually in heat from April to June, or later. With the Cow who is kept for the milk she produces, the season, of course, varies, as care is taken to induce conception again as soon as the milk secretion begins to diminish; but it has been observed that mid-summer is more particularly the rutting period of the Cow. The "heat" in Sheep, though naturally present in September, is usually only shown during summer, because the Ewes are kept apart from the Ram at the natural time; in order that the Lambs may be born at a favorable season—the spring; and the period of suckling over (four or five week), that they may be weaned when the herbage is tender and nutritious. When the animals are bred for the butcher, the rut is induced sooner by putting the Ewes in contact with the Ram at an earlier period, so as to obtain two or three lambings in the year. The Bitch is in heat from December to February, or in the autumn and spring-time. The Cat is in the state of heat in January and February, and also in the spring and autumn; sometimes the heat appears three or four times a year, and the animal may produce young as many times. The Pig manifests rutting in October or November—at least that is the period when it is usually put to the male; and it may be put a second time towards the end of spring, in order to have two litters within the twelve months.

The Frequency and Duration of the Period of "Rutting" or "Heat" depends upon age, species, and other circumstances. One day is the shortest duration of heat, and fifteen days the longest. The shortest period is witnessed in the Cow and Sheep, and the longest in the Bitch. With impregnation it ordinarily ceases until after parturition; and if impregnation does not occur, it gradually disappears until the next period, which is somewhat variable. Its reappearance in the Cow has been noted every month or three weeks,

and sometimes at closer intervals. In the Sheep and Pig it lasts from one to two days, and again appears from the fifteenth to the thirtieth day, usually the thirtieth day. The Mare manifests a desire for the Horse every three or four weeks, which continues for from two to four days. Ordinarily the Bitch is in heat twice during the year; spring and autumn. The duration of this period in the Bitch is usually nine to ten days, but may exist fifteen days.

Rutting and impregnation may and does occur soon after parturition. The Cow, Ass, and Sheep, and, it is believed, the Mare, will copulate with greater certainty of success on the ninth day after easy labor and parturition than at any other time.

The persistence of the condition of heat for longer than the natural period is a symptom of womb or ovarian derangement, and therefore unfavorable. It renders Mares and Cows less serviceable, and repeated intercourse with the male will not always allay the abnormal condition, but frequently aggravates it. Such animals will not breed. In aggravated cases, removing the ovaries (Ovariotomy) has been practiced, and in the Cow the operation is frequently followed by subsidence of the troublesome symptoms for a time; in the Mare it is much less successful.

FECUNDATION.

The effective copulation of the male with the female is followed by certain remarkable changes in the ovum and generative apparatus of the female, which, at first known as fecundation, conception, or impregnation, ultimately results in the formation of a new creature possessed, to a certain degree, of individual or independent life. The copulation to be effective, depends upon the presence of a healthy ovum in the generative apparatus of the female, and the introduction into the apparatus of the seminal fluid of the special organ of the male. This seminal

fluid contains the male germ of generation (spermatozoa), which is composed of organic particles of a particular shape, and endowed with motion. For conception, it is absolutely necessary that the ovum of the female should be brought into contact with these particles. By reason of the movements of the male germ (spermatozoa), and also doubtless through the aid they receive from the special motion of the hair-like cells covering certain portions of the lining membrane of the womb, when the womb opening is patent, are diffused soon after copulation to the most distant parts of that cavity, and high up in the Fallopian tubes.

THE WATERS—(LIQUOR AMNII.)

THE LIQUOR AMNII (Fig. 7, F and D) is an albuminous alkaline fluid contained in the sac, which envelops the foetus during the whole period of gestation. It is in greater or less quantity, according to the period of gestation. This fluid is abundant and limpid at an early period; but becomes scantier, viscid, and citron or reddish-tinted at an advanced stage, when it is adhesive and agglutinates the hair.

THE USES of this water, the LIQUOR AMNII, are varied and important. It is not very probable that it serves as nutriment for the foetus in the early period of uterine life or early gestation; though it has been found in the stomach of young animals. "The waters" preserve an equable temperature for the young creature; maintains the integrity of its exterior before the skin is covered by the peculiar coating; it also favors the movements and developments of the young, by removing it from unequal pressure; diminishes the chance of injury from sudden external movements and shocks, and allows the foetus to obey the laws of gravitation. It also protects the mother from injury by the foetus, towards the termination of gestation. During

parturition, this water protrudes the membranes; is the primary agent in dilating the mouth of the womb; it also shields the foetus from the direct action of the contractions of the womb, whose violence might compromise its existence; the waters renders the dilation of the mouth of the womb easy and prompt; and, finally, by lubricating the vagina, causes the passage of the young creature through it

Fig. 7.

FOETAL MEMBRANES OF THE COW AT MID-TERM. WOMB OPENED ON ITS LEFT SIDE.

A, Neck of Womb; B, B, Maternal After-births; C, C, Foetal After-births; D, D, F, F, Liquor Amnii "The Waters"; E, Bladder of the Urachus; G, Naval String (Umbilical Cord); H, H, Inner Lining (Allantois) of the Outer Water-sac (Chorion).

to be more gentle and expeditious than it would otherwise be.

AFTERBIRTH—(PLACENTA.)

THE AFTER-BIRTH, or PLACENTA (Fig. 7, 8 and 9) is a soft, spongy, vascular body, adherent to the womb, and connected to the foetus by the navel cord (umbilical cord). The after-birth is not in existence during the first period of gestation, but its formation commences

Fig. 8.

FOETAL MEMBRANES OF THE GOAT AT FULL TIME: TWINS.

A, Neck of the Womb; B, Left Horn; C, Right Horn; D, Inner linning (Allantois) of the Outer Envelop or Sac (Chorion); E, The second complete Sac enveloping the Foetus; F, Portion of the Wall of the Womb, where the Foetuses come in contact; G, Union of the Two Outer Envelops (Chorion of the Foetuses).

perhaps with the arrival of the embryo in the womb. It is generally considered to have two portions, one foetal and the other maternal. The foetal portion consists of highly vascular soft hairy filaments and tufts, containing the inosculating loops of the navel arteries and navel vein of the foetus. The maternal portion consists essentially of a large sac formed by the inner coat of the vascular system of the mother, into which the maternal blood is poured by the curling arteries of the womb, and from which it is returned by the veins of the womb and after-birth. At an early stage of gestation the after-birth consists of a temporary mass of albuminoid substance accumulated around the ovum in the womb. When gestation is terminated, the after-birth becomes remarkably rigid, the vessels are obliterated and transformed into fibrous tissue. The formation and lobes of the after-birth varies in different species. In the Cow, Sheep and Goat they are multiple; there being from sixty to eighty after-births of various sizes.

FUNCTIONS OF THE AFTER-BIRTH.

THE FUNCTIONS OF THE AFTER-BIRTH are obvious: It is the nutrient and respiratory apparatus during a portion of the foetal existence in the womb; and for the accomplishment of these functions it must rely upon its intimate and healthy relations with the surface of the womb. The after-birth admits of the foetal blood being shown, as it were, to that of the mother and undergoing requisite changes, therefore it serves as the organ of circulation as well as respiration and nutrition of the foetus. The Horse, Pig, Dog, and Cat have single after-births, while in the Cow, Sheep and Goat they are multiple.

For Illustration See Following Page.)

Fig. 9.

FOETUS OF MARE AND ITS ENVELOPS.

A, Outer Water-sac (Chorion); C. The Second Complete Sac withdrawn from the First, and opened to expose the Foetus; B, Portion of the Navel Cord; D, Foetus.

NAVEL STRING—(UMBILICAL CORD.)

THE NAVEL-STRING (Fig. 7, 9) is a collection of vessels which form the means of communication between the mother and the foetus during the existence of the foetus in the womb, and which loses its functions when birth occurs. The navel-string is visible at the earliest period of pregnancy, and is formed by the vessels which convey the blood between the foetus and its envelops, chiefly the afterbirth. Three vessels enter into the composition of the navel-cord: two arteries and a vein, which are imbedded in connective tissue, that make them appear more voluminous than they really are. Besides the three blood vessels, the cord contains the duct called the urachus, as well as the extremity of the foetal intestine at an early period. The urachus is an irregularly bulging canal, continued from what is eventually the bottom or base of the bladder. After birth it rapidly contracts, especially at the base of the bladder, until it is quite closed, and nothing it left but the folds of the membrane that sustained it, and which now becomes the middle ligament of the bladder. It sometimes happens with the foal, but more frequent with the calf, that the urachus duct does not close and the urine in this case escapes by the navel. For treatment see Persistence of the Urachus.

PREGNANCY—GESTATION.

PREGNANCY, or GESTATION, comprises the period during which the female animal carries its young while it is undergoing development. Its consideration is of much moment.

With the development of the foetus, the womb undergoes important changes with regard to volume. During and after copulation the womb is congested, and when conception has taken place, the vessels, distended with blood, gradually enlarge to a great size. The same changes take place

in the lymphatics and nerves, which were comparatively small in the unimpregnated state. These changes add to the thickness and density of the womb. As the womb increases in volume, it becomes rounder, acquiring a greater capacity, the neck becomes widened, and the proper structure is exaggerated to an extraordinary degree. With the increase in volume, weight, and capacity, the womb likewise acquires a higher degree of sensibility, doubtless from the development of the nerves. So that between the neck, the body, and the horn, there is established sympathetic relation that is sometimes not advantageous; for irritation of the neck of the womb, howsoever produced, may bring on violent contractions of the whole organ, and lead to the premature expulsion of the foetus. This expulsion, as is well known, sometimes follows copulation; though, as a rule, animals usually do not seek to copulate during pregnancy if left to their own natural instincts. This irritation may also be a consequence of manipulation by the hand of the explorer.

The contractions of the womb are very powerful, and are analogous to that of the intestines—extending from the extremity of the horn towards the neck with worm-like muscular contractions, particularly in these animals which, like the Bitch and Pig, have very long horns, with the young arranged one after another in them. (Fig. 10-A.) The contractility of the womb, which signifies also its retractility, enables it to contract on itself after delivery, and to nearly obliterate its cavity. This rapid diminution in the capacity of the organ closes the orifices of the vessels which open on the internal surface of the womb during the act, and thus prevents fatal haemorrhage.

The main functions of the powerful contractions of the womb, however, appears to be concerned in the expulsion of the foetus, and then, as at other times, it is entirely independent of the will. Besides, the intensity of the contrac-

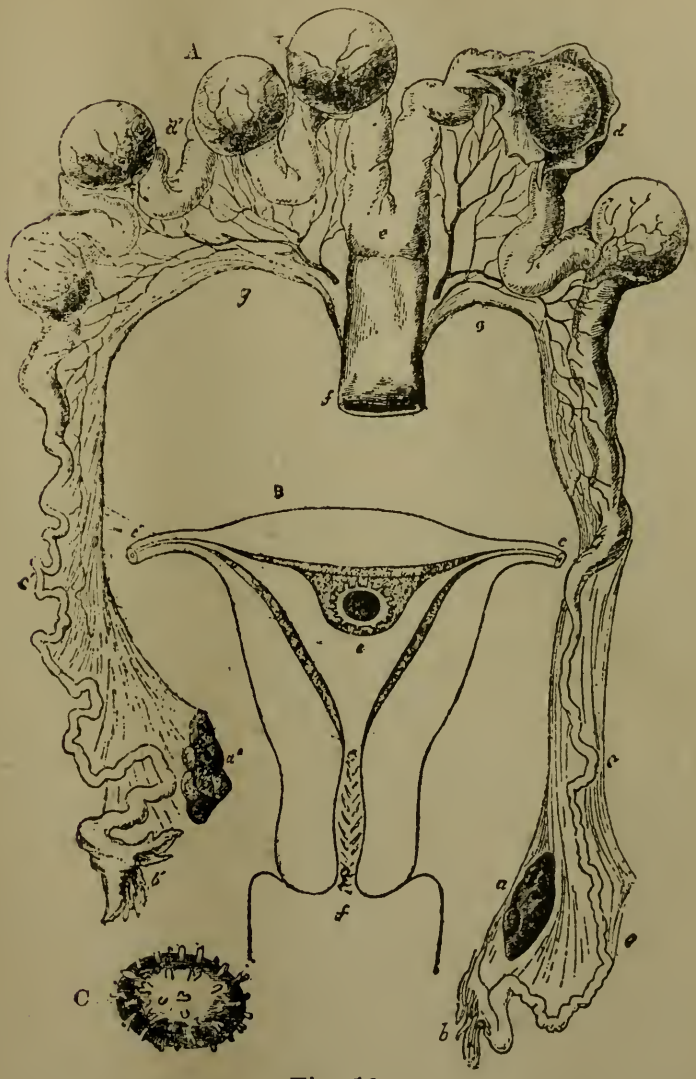

Fig. 10.

THE PREGNANT WOMB OF A MULTIPLE-BEARING AND SINGLE-BEARING ANIMAL.

A, Multiparous Womb; a, a, Ovaries; b, b, Fringe-like Prolongation of the Fallopian Tubes; c, c, d, d, Horn of Womb—that on the left contains four Embryos, on the right two, one of which is exposed; e, Body of Womb; f, Vagina; g, g, Ligaments of the Womb.

B, Uniparous Womb; c, c, Fallopian Tubes; e, Body of Womb, containing early Ovum of Womb; f, Vagina; g, Mouth of Womb.

C, Early Ovum of Womb.

tions is not always related to the strength of the animal; pain deadens and paralyzes the contractile force. When the contractions have been vigorous, the womb rapidly diminishes; but if they have been slow and weak, the organ slowly contracts on itself. When the womb does not contract quickly after delivery it is said to be inert, and the cause is to be found in the expenditure of its contractile power, either through excessive distention, a delivery too prompt or too slow, or general weakness of the maternal system. By prolonged exertion the muscles of the womb become weakened; so that when the act of parturition has been protracted, the contractions of the organ become slow and feeble, or cease altogether. Opiates and narcotics generally produce the same effect, and are therefore successfully administered when the contractions are too energetic or painful during delivery or before abortion. The contractions of the womb are increased or stimulated by irritation of the neck or body of the womb—such as is produced by retention of the whole or a portion of the after-birth, tickling of the neck of the womb by the finger, friction on the belly, the application of cold to the belly, or the administration of ergot of rye.

Not infrequently, if not always, the cavity of the neck of the womb is filled with a plug of thick, adherent, glutinous matter, sometimes so abundant that it also occupies the vagina, and forms an unpleasant obstacle to exploration, though it does not interfere with parturition.

With regard to the DIRECTION of the WOMB, it is to be noted that its horizontal position in the domesticated animals obviates those lateral displacements which are so frequent in women. Its weight, and that of its contents, maintaining it in position, and in a line with the body of the animal. This direction rarely varies to any appreciable degree, and it is only in a case of hernia at the flank, which is very uncommon, that it inclines to one side. Its only

marked inclination is in Cows, whose abdomen is very wide and pendulous. Another change in the direction of the womb, is the more or less complete rotation or twisting of the womb on its axis. Numerous cases are recorded which incontestably prove that, during pregnancy, the womb performs a half, or even a complete revolution on itself, producing tortion of the neck of the womb and the back part of the vagina, and consequent strangulation of the womb near the neck, by the suspensory ligaments; so that spontaneous delivery of the young animal by the natural passage is impossible.

The alterations occurring in the womb necessarily bring about others in the neighboring organs with which it has mechanical relations. In the Mare and Cow the horn in which the limbs of the foetus is lodged becomes extended and displaces the intestines, pushes the stomach more to the left, rests on the liver, and is an obstacle to the free movements of the diaphragm. The pressure of the enlarged womb exercises on the blood-vessels of the hind limbs and the vulva and rectum, retards the venous and lymphatic circulation; so that towards the end of gestation, and especially in the Mare, there is often considerable dropsical-swellings of these parts. This swelling is all the more marked, in the Cow as well as in the Mare, when the compression is greatest at the back part of the abdomen. The swelling is always greatest in those cases, in which there is a giving-way of the abdominal walls near the arch between the hind legs and above one of the udders, when the womb forms a hernia beneath the skin; then there is seen an enormous swelling at the upper part of the limb.

The increase in volume and the various changes which the pregnant womb undergoes, bring about alterations in, and frequently derangement of, certain functions. Fortunately these alterations are slow and gradual; so that the different organs concerned generally adapt themselves to their

changed condition without much inconvenience. The animal becomes lazy and slower in movement, and is more desirous of quiet and tranquility as gestation advances. These indications are observed at an early period. At the same time the abdomen enlarges and changes in shape; it becomes rounded, and projects below and on each side; while the flanks become hollow, the croup and thighs wasted-looking. In the domesticated animals there are rarely observed those disturbances in the digestive organs so marked at the commencement of pregnancy in woman. On the contrary, immediately after conception, the appetite is increased, digestion is usually easier, and all the formative phenomena seem to acquire increased activity; more use appears to be made of the food in the economy, and there is a notable tendency to fatten. This fattening tendency has been taken advantage of by breeders and feeders of animals which are destined more for food than reproduction. In some cases, however, and particularly with the Cow, the appetite becomes somewhat depraved, the animals eating soil, gnawing the walls or woodwork of their stable, drinking foul water etc., and very exceptionally there may be vomiting.

With the increased bulk of the womb, as has been observed, the abdominal and thoracic organs experience more or less the effects of the compression it exercises on them. The diaphgram is pushed forward, and diminishes the capacity of the thorax and the expansibility of the lungs; the ribs, encumbered by the weight of the foetus, are raised with difficulty by the muscles of inspiration, so that respiration is frequent and shallow, and the creature is readily "blown" and fatigued. Digestion may be somewhat impaired and retarded, and slight constipation is not rare. The strain induced by the womb on the vagina, and indirectly on the neck of the bladder, causes the attempts to void urine more frequent; while the compression on the liver, explains the

mechanical obstruction to the circulation and subsequent dropsical swellings, particularly in the Mare.

SIGNS OF PREGNANCY.

The study of the SIGNS OF PREGNANCY is very important. It is sometimes very difficult to speak positively as to the existence or absence of pregnancy. Especially is this the case at the early stage. It has frequently happened that animals whose condition was not at all certain have brought forth young, and others have done the same without giving rise to any suspicion that they were pregnant. In order to study the signs of pregnancy conveniently, they have been classified as follows: 1. The rational signs; 2. The material signs; 3. The sensible signs.

RATIONAL SIGNS OF PREGNANCY.

Usually the first RATIONAL SIGN OF PREGNANCY to be observed, is the cessation of "heat" or "rutting," though it is not the most certain sign of gestation, and may even lead to mistakes. The cessation of heat usually manifests itself soon after conception has taken place (six or eight days), by a decrease of the sexual excitement which marks the period of heat; the animal becomes comparatively tranquil and does not exhibit any desire for the male, neither does she neigh, paw, or show any of the symptoms of heat. If the male approaches, the sexual desires are not excited, and in refusing him the female may even resort to aggressive movements. It has usually been held as a sign of conception, if the female refuses the male soon after copulation, and particularly if a month or two has elapsed, and the Mare is in good condition when well fed. But in some cases the symptoms of "heat" persist for some time after copulation, and the desire of the generative organs is not allayed, although in reality impregnation has taken place; and in very exceptional instances the "heat" will return

after having disappeared for a certain time. Some Mares which have been pregnant for two or three months, and especially those which have been put to the Stallion early in the year, will exhibit indications of "heat" when the weather becomes warmer and the pastures afford more nutriment. When in this state the female may again accept the male, and it may even happen that a second fecundation takes place at this time—thus occasioning those somewhat unusual double conceptions; though if pregnancy is somewhat advanced it is dangerous, and may occasion abortion.

Stallions exclusively employed for breeding, frequently refuse to approach pregnant Mares in which the "heat" persists or reappears; though this is not always the case, particularly with young Stallions.

In the Cow, as in the Mare, heat may continue or reappear after fecundation; though as a rule the male refuses to copulate again when the female is in a pregnant condition. The pregnant Mare and the Sheep, as well as the pregnant Cow, manifest signs of "heat"; but the Bull knows the indications of gestation, better than the Stallion or Ram, and abstains from having intercourse with Cows which are in this state. For cattle, therefore, it is an almost certain sign of pregnancy when the Bull refuses the Cow, when she is in heat.

It has been generally observed that a change takes place in the character of the animal which has conceived, and this sometimes almost immediately after conception. Mares which were previously vicious, troublesome, or unsteady when in "heat," are nearly always gentle and tractable when in foal; the genital excitement, which caused this viciousness, being allayed, they are no longer under its influence. This change, when occurring after copulation, is a valuable sign of successful impregnation, and though it sometimes may fail, yet when present it can scarcely lead to a mistake. If, on the contrary, the animal has not been fecun-

dated after one or more coverings, if previously vicious its vices become exaggerated when again put to the horse.

In the Cow similar symptoms may be remarked, though it is not so frequent or marked as in the Mare.

The other animals are seldom so irritable in their disposition as to lead any one to notice a similar change in them.

A tendency to fatten is such a notorious consequence of impregnation that with the Cow and Sheep grazers usually resort to it in order to get these animals in good condition for the market, when they are intended for slaughter. But this aptitude is most marked in the early months of gestation; for in the Cow towards the last three months, and in the Sheep and Pig at the last month, when the udder begins to enlarge, there is a tendency to lose condition.

With the progress of gestation, those animals employed in labor for speed or draught lose their vigor somewhat, particularly towards the end of pregnancy; they become "soft," and their paces slower and heavier—consequently they require more urging to make them perform a certain amount of work. Mares trot, gallop, and jump with more fatigue, and yield themselves far less readily to inordinate exercise than before, either because their temperament alters, their instinct urges them to preserve their progeny, or the foetus itself physically embarrasses them in their movements. But this is not always a sure sign; for sometimes, though rarely, Mares will perform their work with the same energy and speed as before conception, even up to a very brief period before parturition commences. Taken with other signs, nevertheless, this may afford assistance in giving an opinion on gestation.

During the period of pregnancy, Cattle and Sheep are more tranquil, and rest much; as do also Pigs and Bitches.

MATERIAL SIGNS OF PREGNANCY.

THE MATERIAL OR PHYSICAL signs are those depending upon the changes in volume of the abdomen and the udder.

The abdomen enlarges in every direction, and at the same time changes its shape. As it becomes larger it descends or drops; the flanks become hollow, and the spine appears more concave; while the latteral portions of the croup sink to a noticeable extent. These changes are progressively developed as gestation approaches its term, when they are very evident.

The enlargement of the udder is a sign which varies considerably in different species. In the Mare and Cow, they begin to increase soon after conception—towards the second and third month. The udder is more prominent and firm to the touch, loses its wrinkles, and the teats are more visible. This appearance is generally only temporary and partially disappears, to reappear again more markedly after some weeks; then to subside and show itself several times during the period of gestation. Besides this enlargement of the udder in the Mare and Cow, which may be accepted as a certain indication of pregnancy, these glands furnish towards the last third of the period of gestation, a yellow, viscid, transparent liquid similar to white of egg, and which can be easily extracted from the teats by milking. In those which have never conceived, manipulation of the teat may furnish a drop or two of a watery-like fluid, but in two or three months after gestation it becomes viscid in consistency. In the last three weeks of pregnancy this liquid sometimes becomes white and opaque, and is then proper milk When the animals have been bred several times, the increase in the size of the udder is only noticed in the last days of gestation. In milch Cows, and particularly in those which are not good "milkers," another sign is to be found in the diminution of the lacteal or milk secretions, and the shrinking of the udder sometime after

conception—usually about the twentieth day. In the pregnant Mare, which still has a Foal running with her, the secretion of milk also ceases sometime before parturition: and the animal appears to be aware of this, for it weans the Foal generally between the sixth and eighth month.

In the smaller animals the enlargement of the udder and the appearance of the milk are usually remarked earlier, and more regularly, than in the large creatures. In those smaller animals which have borne young, similar changes take place as those observed in the Mare and Cow, but the udder may be later in enlarging.

It may be noted as an additional aid in determining pregnancy, that with the progress of gestation the membrane lining the vulva and the vagina becomes swollen, and assumes a red or bluish-red hue, instead of its usual pink color; and towards the termination of pregnancy, the vaginal secretion is greatly increased; particularly so in the Cow.

All these numerous signs are by no means to be implicitly relied upon, as they are not infallible in proving the existence of pregnancy in every case. However, if all the above signs are manifest in an animal, they establish a very strong presumption, though not an absolute certainty, as to its condition.

SENSIBLE SIGNS OF PREGNANCY.

Towards the fourth month in the larger animals, the young creature can move. The Sensible signs and indications are obtainable by three manual explorations: the abdominal, rectal, and vaginal.

ABDOMINAL EXPLORATION.—The feel of the abdomen does not yield equally certain results in all the domesticated animals. In those which are small, as the Bitch and Cat, a little careful manipulation will render the presence of the foetus very evident towards the middle period of gestation; but in the Mare, Ass and Cow it is more difficult, and with these animals it is better to make the exam-

ination when they are in a standing position, as the signs are not so perceptible when in a recumbent position. The examiner stands on the right side of the Cow, the left of the Mare, with his back towards the animal's head, and applies the palm of his right or left hand against the abdomen, immediately below the flank, about eight or ten inches in front of the stifle, and just above the udder, pressing moderately, the other hand resting on the back. At this part of the abdomen a hard voluminous mass can be felt in the womb, while the movements of the foetus are perceptible as it stirs at irregular intervals, and causes the jerks and shock of its displacements to be communicated to the walls of the abdomen. These movements are strongest in the morning, and are more distinct if the mother is eating or drinking, especially if the water is cold. The young creature can also be excited to movement by the spraying of cold water against the belly, or by the application of the cold wet hand. In the Cow, smart compression of the abdomen with the closed fist at the part just indicated, so as to push the womb upwards and allow it to return with a little force, is also a good method of ascertaining the presence of the foetus, and will prove successful when simple application of the flat hand will fail. This is most likely to be successful when there is not much food in the stomach. At a more advanced period of pregnancy, in the last two months, the movements of the foetus can be easily observed as it jumps about briskly, striking the interior of the abdomen at brief intervals. This, with the other signs at this time, leaves no doubt as to the existence of pregnancy. The foetal movements are never more marked than immediately before abortion, at a late period of gestation; they are then energetic, and to all appearances conclusive. With the smaller animals the same method of abdominal exploration may be resorted to, and with the same, or even better results. The perceptible movements of the foetus, of course, settle the question as to pregnancy and the vitality of the

young creature; but the absence of these movements is not conclusive that pregnancy does not exist, for it has frequently happened that he foetus remained insensible to this kind of excitation, and yet was alive at birth.

RECTAL EXPLORATION can only be successfully carried out in the larger animals, because of the small dimension of the passage in the Bitch and Cat. There is but little danger to the larger animals so long as reasonable precautions are taken not to produce injury; the foetus has even been pushed gently about in the womb without any accident to it or the parent.

TO EXAMINE the animal by the RECTUM it should be standing, and if dangerous or irritable, the twitch may be applied to the nose, or for safety to the operator the hind limbs must be secured; with the Cow, the nose seized by one hand of an assistant and a horn by his other hand, will be sufficient. By the hand the bowel should be emptied of the dung it may contain, so as to allow the oiled hand and arm of the explorer to be introduced and freely moved about. When the abdomen is large and pendulous, it is useful to place the animal higher before than behind, and to have the lower part of the belly raised by assistants on each side, by means of a sheet or sack, so as to throw the womb backwards and upwards; though in the majority of cases these measures are not necessary. After oiling the arm and hard thoroughly with clean lard or with sweet oil, pass the hand into the rectum (the last bowel), open the hand, place the palm on the lower surface of the bowel and gently press downward, towards the floor of the abdomen; when there will be felt, if the animal is pregnant, a hard, irregular mass, more or less voluminous, according to the stage of gestation, and capable of being displaced to a certain extent. If parturition is near, the head or other parts of the foetus can be distinguished through its envelops and the womb and bowel walls. But if pregnancy is not so advanced—say only at the sixth month—the foetus can-

not be so readily felt, and it may happen that at this period it is situated low down in the abdomen, or well forward in one of the horns of the womb and lying to one side (nearly always to the right in the Cow); so that an inexperienced or careless examiner might miss it altogether at the first exploration. This error can be avoided by carefully moving the introduced hand to the right and left as far as the bowel will permit. The foetus should be excited to move, if possible, so as to guarantee its presence. The difficulties are greater if it is desired to ascertain whether the foetus is dead or alive. Sometimes we may at once perceive the movements of the foetus in the womb; but at other times it is motionless, and cannot be made to exert itself except by moving and pushing it several times. This, however, is not commendable, unless performed with the greatest gentleness and care, as serious complications, especially abortion might be the result; therefore, unless urgent, this should be omitted.

VAGINAL EXPLORATIONS can only be practiced on the larger animals, and even then it is not so valuable as the exploration by the rectum or bowel. The vaginal examination is made with the animal in the same position as for the bowel examination, and the hand, well lubricated with clean lard or sweet oil, is inserted into the vagina as far as the neck of the womb. In the first months of gestation the womb descends into the abdomen; consequently, the vagina is longer and more inclined downwards in front; while the foetus is beyond reach of the hand. Towards the fifth or sixth month, the womb, in expanding in every direction, approaches the vulva, and the canal of the vagina being shortened, the womb can be perceived. The same manipulations as were practiced in the bowel, may be employed in the vagina at this time, but the results are far from being satisfactory; the vaginal examination, should therefore, never be preferred to that of the bowel.

DURATION OF PREGNANCY.

THE DURATION OF PREGNANCY varies considerably in different species of domesticated animals; and even in the same species there are individual variations which, though not very great, are important; so that the exact term cannot be rigorously fixed.

With regard to the breeds, it has been remarked that the Hungarian Cow averages ten days more than the Dutch Cow. With the male foetus, the duration of gestation is longer than in the case of a female foetus. It has been observed that the male parent has an influence on the duration of pregnancy. For instance, a Mare which has copulated with a thoroughbred Horse will be longer pregnant than when impregnated by a common-bred Stallion; and the Mare which has copulated with the Stallion Ass goes longer than when impregnated by a Horse. The duration of pregnancy also depends upon the age of the female, and her strength and condition; a weakly or much-worn animal does not go so long as one which is strong and well fed.

The differences in individuals of the same breed or species may be partly accounted for by the fact, that impregnation is possible at any time during heat; and if copulation has taken place several times during this condition, it is impossible to predict when conception took place, and even when copulation has only occurred once between the male and female, fecundation does not necessarily coincide with this intercourse; as the ovum of the female may meet the male generative germ (spermatozoa) in different regions of the system of the womb, and may, therefore, only be fertilized some days after copulation. The time required for the ovum to pass through the Fallopian tube also varies in different animals. In the Rabbit and Guinea-pig, for instance, it takes three days; in the Mare, Cow, and Sheep, four to five days, and in the Bitch from eight to ten days.

Various circumstances may retard or accelerate the

development of the foetus. With some animals it may apparently remain for a number of days in the womb after it is ready for birth, without inconvenience to the mother or itself, just as it may be born several days before the ordinary period without compromising its safety.

The Duration of pregnancy with the Mare is usually eleven months, though it may vary between ten and twelve; with the Cow nine months; Sheep and Goat five months; the Pig is usually pregnant four months, or according to some authorities three months, three weeks, and three days; the Bitch is pregnant about two months, or from 58 to 65 days; the Cat is pregnant from 50 to 60, 62, or even 64 days.

MULTIPLE PREGNANCY.

The causes of multiparity are not well ascertained. It may be due to simultaneous ripening of two or more Graafian vesicles, which, rupturing at the same time, allow the escape of the ova they contain, and which may become impregnated at a single copulation. Or a Graafian vesicle may contain two or more ova, and these arriving together in the womb, may be fecundated at one time. Or it may be that the membrane surrounding the ovum contains two yolks, as sometimes occurs in the fowl's egg.

Of all the domesticated animals, the Mare is the one which least frequently brings forth more than a single creature at a birth; and when more than one foetus is present, they are usually born dead or die soon after birth. The female Ass more frequently brings forth twins than the Mare; but even in the Ass twins are rare. Double and triple births are not unusual in the Cow, the former being far from uncommon. With the Sheep, twins are a very common occurrence; and it is a saying that in a good flock there should be as many Lambs as Ewes, the double births compensating for the losses. The Goat is generally considered an uniparous animal, but it would appear that this

is a mistake, as double and triple births may be said to be the rule, and not at all infrequently four are produced. But usually with three or four at a birth, one or more are feeble or born dead.

A curious fact in connection with the production of twin calves, is that when the young are of both sexes, the female is generally unproductive. It is a fact known, that when a Cow brings forth two calves, one of them a Bull-calf and the other to appearance a Cow, that the Cow-calf is unfit for propagation, but the Bull-calf grows into a very proper Bull. Such a Cow-calf is called a Free-martin, and is commonly as well known among the farmers as either Cow or Bull. It has all the external marks of a Cow-calf—namely, the teats, and the external female parts. The Free-martin does not show the least inclination for the Bull, nor does the Bull ever take the least notice of it. In form it very much resembles the Ox or Spayed Heifer, being considerably larger than either the Bull or the Cow, having the horns very similar to the horns of the Ox.

POSITION OF THE FOETUS IN MULTIPLE PREGNANCY.

The relative position of the young, when more than one exists in the womb, is important to give some attention. With regard to each other, it may be said that they occupy four different positions: 1. Each foetus may be isolated and enveloped in its own proper membranes; 2. If there are two foetuses they may have a common envelop, and otherwise have a second separate sac; 3. Both may be developed in the same cavity and the same amnii or waters, their membranes being common, and no partition existing between them; 4. One foetus may be contained within the other by "inclusion," as in monstrosities.

In the first above named variety of pregnancy, the envelops, where they are in contact, adhere together by means of fine connective tissue; the after-births are often

confounded, or united by a kind of membraneous connection, though their circulation remains distinct. In such a case the young may be expelled from the womb together; but more commonly, after the birth of the first foetus, the womb contracts on itself, enclosing the remaining progeny, which may not be born until some days after. This apparently prolonged retention of the second foetus is generally due to the fact that the first is expelled prematurely, because of the excessive distention experienced by the womb;

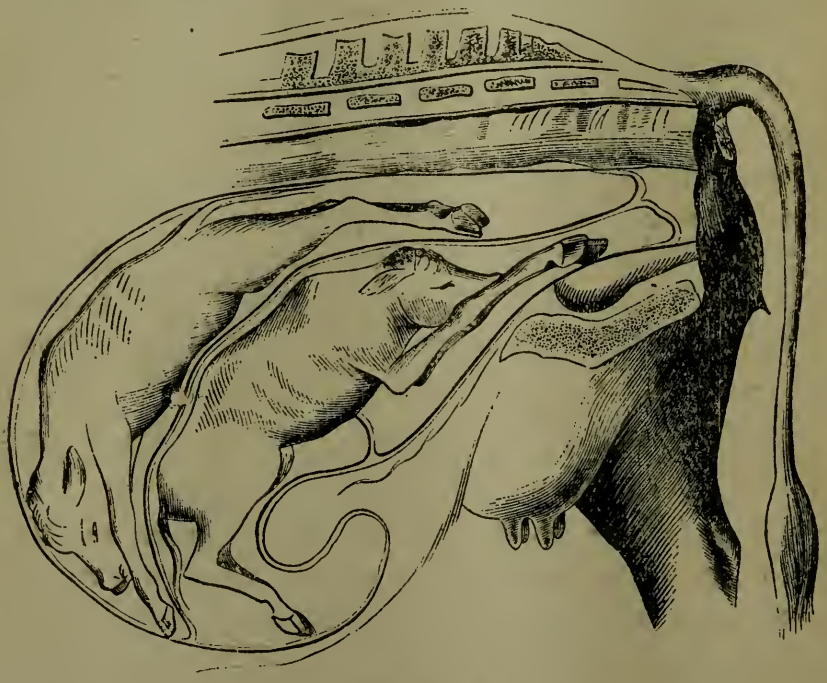

Fig. 11.
TWIN PREGNANCY: COW.

the womb, having thus got rid of its embarrassment and become relieved, can then maintain the second foetus until the usual time expires.

If one of the foetuses dies in the womb, the other, being contained in a separate envelop, may continue to live and grow. In somewhat rare cases, the dead foetus remains in the womb, becomes desiccated, and is not expelled until the birth of its companion at the usual period;

or, which is more common, it acts in the womb as a foreign substance, the presence of which is irritating, and by inducing contractions of that organ it is extruded, while the living foetus is retained and grows until the normal time for delivery. Death of the foetus in these multiple cases appears to be due, either (1) to the stronger vitality of the one which by attracting to itself a larger share of nutriment, starves the other; (2) to the too considerable increase in volume of one foetus, which compresses the other; (3) or to the separation of the foetal from the maternal afterbirth, which, of course, causes an interruption to the circulation of the young animal, and a suspension of nourishment.

In this variety of pregnancy where the two foetuses have one common envelop, there is only one after-birth; the two having a circulation in common through their afterbirth and the navel vessels communicating by their vascular ramifications. In this case the expulsion of one foetus necessarily brings about that of the other. These results may be expected in the second and third variety, before mentioned.

In the fourth variety, as there are only two instances on record, it will be unnecessary to enter into farther detail.

HYGIENE OF PREGNANT ANIMALS.

The hygienic measures to be observed in the management of animals during pregnancy are, in general, those which should prevail always, irrespective of this condition. But besides these there are a few particular precautions to be attended to, in order that this period may be safely and successfully passed through, and these precautions are all the more necessary as the period of birth approaches.

When an animal is believed to be pregnant, it should not be allowed near the male again. With those animals

which are employed in labor—as the Mare, and sometimes the Cow—it is well not to work them severely nor fatigue them much, and particularly as pregnancy is advanced; and, on the other hand, absolute repose is not advisable. Exercise is most beneficial, and the most difficult cases of parturition occur among animals to which exercise is denied. The pragnant Mare will accomplish ordinary and acustomed work, particularly if it be slow, without any harm, perhaps with benefit, until the seventh, eighth or ninth month, when more care should be observed; but moderate exercise should always be allowed up to the period of parturition. Harness is preferable to saddle work for pregnant Mares; and fast trotting, galloping, jumping, traveling over broken ground, or severe and sudden exertion, injuries, or shocks of any kind, are to be avoided—in fact, extremes should be guarded against. If the animal must be employed for riding, the use of the spurs should be abandoned, because of the sudden contraction of the muscles which their application induces, which may lead to abortion. If the Cow is kept for milk production, the milking should cease about the seventh month; though with well-fed Cows it is often prolonged until near parturition. Nevertheless, there can be no doubt that this practice is detrimental to the foetus, by arresting or retarding its development, through direvting into the udder the materials which should be disposed of in the womb.

Unemployed animals ought to be regularly exercised by hand. Exercise at pasture is beneficial to all animals; even the Pig and Bitch are greatly benefited by movement.

THE FOOD of pregnant animals is an important consideration. Creatures in this condition should be well fed, and especially if they have to accomplish a certain amount of labor or yield milk. The appetite is generally increased, and there is a tendency to fatten. This tendency should be somewhat guarded against, as it may prove troublesome,

particularly if it is allowed to proceed to an extreme degree; when it may retard the development of the foetus, induce abortion, cause difficult parturition, or give rise to serious after-consequences. This precaution is more to be observed in the second than the first half of pregnancy, when the food should be plentiful, but not in excess, and flesh more abundant in the animal than fat. Indigestion should be carefully guarded against. The food should be of good quality, very nutritious, easy of digestion, and not likely to induce constipation. Grazing on pastures is favorable to the pregnant condition of herbivorous animals, and especially if the land is not too broken, or sloping, and the herbage is good; as they take their own exercise, and breathe a purer atmosphere than that of the stables or sheds. But it must be remembered that they should be protected from damp, fogs, cold rain, stormy weather, etc. If the herbage is not sufficiently abundant and nutritive, an additional allowance of other food will be necessary. It is beneficial to add salt to the rations of the pregnant animal, especially in those regions where inflammation of the joints is prevalent among young animals. The phosphates so necessary for the formation of certain tissues of the body, may be deficient in the herbage; and this may be compensated for by giving as a part of the rations, bran, meal, oil-cake, etc., and even properly prepared bone-dust.

THE WATER should be pure, and plentiful at all times: as then the animal will drink only moderate quantities, and when necessary. A point to be particularly attended to, is not allowing pregnant animals to drink very cold water, nor eat food at a low temperature. As has been previously stated in this compendium, the foetus is extremely susceptible to the action of cold, and abortion is by no means unusual through the careless administration of cold water or cold food.

With regard to the DWELLINGS, cleanliness is, above

all things, necessary to be observed. Near foaling time—three weeks or a month—the Mare should be kept apart in a roomy loose-box, and when convenient, within sight of the other Horses with which it has been accustomed to associate. The Cow is usually allowed to remain in its ordinary stall in the cow-shed; but overcrowding and want of space should not be allowed, and every Cow, towards the end of pregnancy, ought to have plenty of room in its stall, if a separate box cannot be allowed. With stalls the floor should slope very little, if any, from before to behind; for if this inclination is at all marked, the weight of the womb is thrown backwards, and this may lead to abortion, prolapsus of the vagina, and even eversion of the womb. The stall should be well bedded, to prevent the animal from soiling itself. Should a case of abortion occur in a stable or shed, among pregnant Cows, the one which has aborted should be removed at once, and the place it occupied thoroughly cleansed and disinfected, and every trace of the accident most scrupulously obliterated; as without observing these precautions, abortion may be induced in the other Cows. Cows which have indications of approaching abortion, ought also to be removed from the vicinity of other pregnant animals, and kept apart from them so long as there is any vaginal discharge; and the same precautions must be adopted with regard to thorough disinfection and cleansing. It is not advisable to have Cows bring forth among others whose period of gestation has not arrived.

Mental and physical TRANQUILITY are essential conditions of successful pregnancy. Harsh or cruel treatment on the part of grooms, cow-keepers, shepherds, and others, should be sternly suppressed; and fear, generally produced by young dogs hunting the animals, and particularly pregnant sheep is to be averted if possible. It is advisable not to have animals of other species in the same field or pasture with those that are pregnant, more especially toward the period of parturition.

Above all, it is necessary to guard against the use of drastic purgatives, or even laxatives, for the relief of constipation, which may not exist; as with some animals these medicines, by increasing the muscular action of the bowels, indirectly excite contraction of the womb. If there is constipation, suitable diet is a safer remedy than physics. Powerful narcotic, sedative, and other medicinal remedies, are to be avoided; even if they do not injure the mother, they may imperil the life of the foetus.

STERILITY—BARRENNESS—INFECUNDITY.

The loss to farmers, as well as to owners of Stallions and Bulls, on account of barrenness, is sometimes enormous. Barrenness exists both in males and females. If a number of females are bred to a certain male animal and fail to conceive, there is something wrong with the male and he is considered barren or sterile. Again, certain females may be bred to a number of male animals, without conceiving, then the fault is with the female, and she is considered barren. Barrenness, temporary or permanent, in the female, is a common occurrence, and is sometimes serious. It is more frequently met with in the Equine than other species.

BARRENNESS—STERILITY IN THE MALE.

CAUSES OF BARRENNESS IN THE MALE.—In the male barrenness may be due to many causes, as hardening of the testicles, the result of inflammation; softening of the testicles from being pampered, and liberally fed upon starchy food without sufficient exercise; imperfect development of the testicles, as in the case of ridglings. Change of climate has sometimes a marked influence on the generative organs, at times only for a season, and again it renders the male animals incapable of impregnating females. There are also several diseases of the generative organs,

which tend to produce barrenness, as inflammation of the membrane covering the penis, ulcerations of the penis, warts on the end of the penis, paralysis of the penis, tumors affecting either the testicles or penis, tumors affecting the excretory ducts of the testicles, enlarged prostrate gland, injuries or disease of the back and loins rendering the male animal unable to mount the female; serving too many females within a few days, will sometimes render the male sterile for the balance of the season. Or the fault may be due to the absence of the male generative germs (spermatazoa) in the seminal fluid.

TREATMENT OF BARRENNESS IN THE MALE.—All the foregoing causes and conditions should be carefully considered and given prompt attention, if the owner wishes to use the animal for breeding purposes. If the animal is barren from imperfect development of the testicles, as in ridgling, castrate at once and convert into a good work horse. If the sterile animal is other than a Stallion, fatten for the market, as the animal will never be of any use for breeding purposes. When there is softening of the testicles from being too fat and fed upon starchy food, give plenty of exercise, and avoid feeding corn, wheat, or other starchy food, and feed oats, bran mash, cottonseed cake, etc. When there is hardening of the testicles, grease them with the following preparation:

Iodine .....one-half ounce.
Alcoholic Extract Belladonna...one-fourth ounce.
Camphor .....one-fourth ounce.
Vaseline or lard .....four ounces.

Mix thoroughly and apply gently. Where self-abuse has been continued for a considerable length of time, castration is the most profitable method to pursue. Ulcerations of the penis, are best combatted by filling the ulcers with calomel, a few times. Warts should be extirpated with the knife and afterwards touched with lunar caustic or acetic

acid. Too much stress cannot be placed upon the evil of serving too many females in a short space of time. One service a day, is all that should be allowed during the season. Two services may be permitted in one day, by allowing five or six hours to elapse between each service, but this should not be continued daily. The indiscriminate and injudicious methods practiced by some owners of sires by allowing four, five, and sometimes as high as eight services in a single day, is very liable to cause a weakness of the testicles, so that the fluid secreted thereafter for a considerable length of time, will be deficient in impregnating properties (spermatazoa), and although the animal may seem vigorous and continue in service, the female will fail to conceive, through no fault of her own.

BARRENNESS—STERILITY IN THE FEMALE.

CAUSES OF BARRENNESS IN THE FEMALE.—Sterility in the female, has also a variety of causes. Prolonged continence and old age are not infrequent causes, as is witnessed in Mares which have worked for many years in towns, and then transferred for breeding purposes. Change of climate has in many cases a marked influence on sterility—sometimes rendering the animal sterile for only a longer or shorter period, while at other times barrenness becomes permanent. The generative organs may also be impaired, and fecundity suspended temporarily or permanently, by abuse of the generative functions, bad hygiene, etc. The female may fail to conceive from premature or tardy copulation when the generative organs are not in a physiological condition for conception, or when they are in an irritable, abnormal state; but this cannot be termed sterility.

Under-fed or over-fed animals generally do not breed so readily as those which are in moderate condition; fat animals are especially unfruitful; as in these pampered, highly-fed, fat animals, there is generally found a fatty

condition of the ovaries. Excitable, vicious females are less likely to procreate than those which are of an equable and gentle disposition. An animal with a mild disposition is often impregnated at one attempt; and it has been observed that with Mares accustomed to work, active exertion, even to produce fatigue, before being put to the horse, is favorable to conception. So it is that the Arab submits his Mare to a severe gallop, and brings her almost breathless before the Stallion, when, copulation being accomplished, he leaves her quietly at rest for some hours.

Barrenness may also be caused by disease or alterations in the ovaries, Fallopian tubes, womb, or vagina; and if any material obstacle to the contact of the spermatic or seminal fluid of the male with the ovum of the female be present in these parts, impregnation cannot take place. Sometimes tumors of various kinds in this region cause sterility. An imperforate, dense, and tough hymen may be another cause. The male generative germs (spermatazoa) may have their vitality destroyed by the acid or other secretions they meet with, when introduced into the female genital canal; or the impregnated ovum of the female may be unable to fix itself on the mucous membrane of the womb because of inflammation existing there. Occlusion or closing of the mouth of the womb has been known as a cause of barrenness in the Mare and Cow from the earliest times. This closing of the mouth of the womb may be complete during copulation, which will prove fatal to impregnation; or it may be due merely to a spasmodic condition of the muscles of the neck of the womb. Leucorrhoea or whites is a frequent cause of sterility.

TREATMENT OF BARRENNESS IN THE FEMALE.—All the causes should be considered and a careful examination made, as removal of the obstacle to generation may, in many instances, be quite within the scope of surgical or medical measures. The oiled hand should be introduced into the vagina, and if the mouth of the womb

is found to be closed, smear the neck of the womb with extract of belladonna; within two hours' time make another examination and if the mouth of the womb still remains closed, in many cases this closure can be remedied in the very safe and simple manner following: The animal is secured—if a Mare by the "side-line," if a Cow by fastening the two hind-legs together, though not too close—and the oiled hand, in the form of a cone, passed up the vagina to the neck of the womb in a half-rotary or screwing manner; on reaching the mouth of the womb, the tips of the fingers are to be gently inserted by the same movement into the mouth and pushed on until the cavity of the womb is reached; the animal should be put to the male on the same or the following day. This simple operation for the cure of sterility has been very often practiced, and is well known to the Arabs of the Sahara, who treated their barren Mares in this manner, and in the majority of cases with success. A simple sound, the size of an ordinary catheter, well greased, may be employed with the same object as the fingers, and appears to answer quite as well. Various instruments have been devised to dilate the mouth and neck of the womb, but nothing is equal to the fingers or the sound.

In the United States, Lyford's method of ensuring impregnation when the mouth and neck of the womb is at fault, has ben extensively practised, with excellent results. Use is made of what he terms impregnators and dilators. The impregnator consists of a hollow tube or cone, composed of soft rubber of sufficient thickness and firmness to retain its shape and resist the pressure of the neck of the womb. Somewhat constricted at the disc portion, in order that it may be self-retaining (Fig. 12, a), the posterior surface of the disc is somewhat concave, to admit the urethral sinus of the penis; while the canal in the body is sufficiently wide to allow the semen or seminal fluid an easy passage through the tube to the end (b), which projects into the

womb. These impregnators are in three or four sizes, to fit differnt sized wombs; and to render them less objectionable to both the male and female, the disc (Fig. 13, a), as well as the bulb (b), is hollow and very elastic, so that connection between male and female takes place almost as if no foreign body intervened. The advantage claimed for these articles are: Close approximation to the natural condition of the neck of the womb during copulation, and so rendering the communication between the cavity of the womb complete, thus assuring easy access for the semen; they are easily inserted; are ready for immediate use; and they are cheap and durable. The dilator (Fig. 14) greatly facilitates the introduction of the impregnator, by dilating the mouth of the womb and displacing any obstruction that

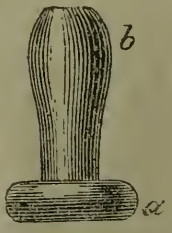

Fig. 12.
IMPREGNATING TUBE.

a, Disc; b, Bulb.

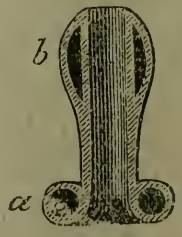

Fig. 13.
SECTION OF IMPREGNATING TUBE.

a, Disc; b, Bulb.

may exist, thus allowing the neck of the womb to envelop the impregnator easily and closely, as well as saving much time in inserting it. This is accomplished by the left hand in the vagina placing the impregnator—in which is the dilator—at the entrance of the mouth of the womb, while the right hand makes the necessary pressure on the handle of the dilator to push it into the canal of the womb; the left hand retains it there until the dilator is withdrawn. The Stallion is then allowed access to the Mare and within five minutes after copulation the tube is extracted by means of a tape attached

to it, the end of which has a ring, and hangs outside the vulva.

Moderate rigidity of the neck of the womb, which cannot be overcome by prompt manipulation with the fingers or tubes, may be combatted by means of sponge tents introduced into the mouth of the womb. These are made by soaking a sponge to which a long string has been securely tied, in a strong solution of gum arabic; it is then closely wound round with a thread, so as to form an elongated, pointed mass four or five inches long. When dry the thread is removed, and the sponge, being slightly smeared with grease or glycerine, is passed into the mouth of the womb, where it is left to soften and expand, in doing which it widens the canal. The operation of inserting the tent must be performed quickly, either with the fingers or forceps, before it absorbs mucus which will cause it to lose its rigidity and make it difficult, if not impossible, to apply. In some instances it may be necessary to make a few incisions in the neck of the womb before an opening can be forced; this can be accomplished with a thoroughly cleansed, small-bladed penknife; then force an opening either with the fingers or the sound. But this cutting operation should never be resorted to until the simpler and safer means have failed.

When the womb is excitable and irritative, causing straining and ejection of the seminal fluids or semen, it is best to give the female a good run or a hard day's work—something to compel the animal to become fatigued, then breed immediately and she will likely conceive. If barrenness is due to a fatty condition of the ovaries, where the animal is very fat and pampered up, place it to work and work hard for a month or six weeks, feeding on a limited quantity of oats and hay; but if from too low a condition, and overwork, reverse the conditions. If from leucorrhœa or whites, treat for this ailment. If from diseased ovaries,

the animal should be spayed. If only one ovary becomes affected, that ovary should be taken away, when the animal will possibly breed all right. When Mares become greatly advanced in years, say seventeen to twenty, without ever producing a colt, they should not be bred, as the pelvic bones become solidified and difficult delivery is the result, probably ending in the loss of both Foal and Mare.

PATHOLOGY OF PREGNANCY.

In the PATHOLOGY of pregnancy will be included influence of pregnancy on ordinary diseases, and the diseases and accidents incidental to pregnancy.

PATHOLOGICAL DISTURBANCES INCIDENTAL TO PREGNANCY.

Pregnancy in animals brings about certain modifications in the organism which may sometimes call for serious notice, either when it leads to a morbid predisposition, or in its influence on the progress of certain diseases already existing at the time of conception, or which have developed during pregnancy. There are also maladies which are peculiar to pregnancy, some of them of much importance.

INFLUENCE OF PREGNANCY ON ORDINARY DISEASES.

The influence of pregnancy has often been productive of marked effects on the course of ordinary diseases. And these influences may have been due, directly or indirectly, in some cases at least, to the condition of the blood in the female, the red globules of the blood, also the albumin is greatly decreased, while the serum of the blood is much above the normal standard. Owing to this decrease in the solid portion of the blood, the blood of the pregnant female contains more white, than red globules; therefore depletive

measures should be carefully resorted to, or, better still, abstained from. The mechanical effects of the foetus, and the immense volume of the womb, must also produce disturbance of most essential functions, and more especially those of the abdominal and thoracic organs. Therefore it is, that during pregnancy such affections as indigestion, colic, tympanites, or pneumonia, are so frequently followed by abortion and slow convalescence, or death of the animal.

Chronic diseases have in general but little influence on pregnancy. It has been thought by some that "broken wind" in the Mare is much relieved during pregnancy; but some observations would go to prove that it is rather aggravated—though the troublesome cough does not appear to prevent the foetus reaching its full period.

Acute diseases are more serious, and especially those of an epizootic kind, which often cause abortion or induce premature labor. Influenza very often leads to abortion in Mares, and the contagious pleuro-pneumonia of cattle has frequently the same result, death being more frequent as pregnancy is well advanced. Sheep-pox is also more serious and more often fatal in pregnant sheep, and most frequently followed by abortion. Abortion has been a notorious sequel of "foot-and-mouth disease," in which the losses from this cause have sometimes amounted to fifty, and even more, per cent. Painful and nervous diseases are also more serious during pregnancy than at other times.

DISEASES INCIDENTAL TO PREGNANCY.

The chief maladies or morbid conditions which have been noted in animals are Pica, rickets, constipation, colic, dropsical swellings, partial paralysis, cramps, congestion of the brain, cough, inflammation of the udder, bloody serum or milk.

PICA, OR LOSS OF APPETITE.

The appetite of pregnant animals is sometimes depraved, and they will ingest foreign matters—such as plaster licked from the walls, wood gnawn from their stable fittings, earth, etc. This depraved appetite may be corrected by careful attention to the quantity and quality of food, to which should be added powdered extract of gentian.

DOSE.—Mare, one drachm; Cow, two drachms; Sheep and Pig, twenty grains; Bitch, five grains. Give three times a day, mixed in the food.

The Herbivora should be allowed common salt in their food, or to lick.

RICKETS AND SOFTENING OF THE BONES.

Softening or fragility of the bones, has been frequently observed in pregnant animals, and especially those which are young. There is considerable increase in the organic matter of the bones, and a corresponding decrease in the orniganic matter, especially of calcium phosphate: the long bones are more particularly affected, though the whole skeleton may be involved. The bones become softened, are often enlarged, and are friable and brittle; so that in advanced cases fractures occur readily, while deformity is not at all rare.

CAUSES.—It is generally due to the animal receiving insufficient food, or eating that which is deficient in mineral matters—such as lime and phosphorus—as well as nitrogenous constituents. When pregnant animals are not well fed, the foetus makes such demands upon the mother for growth materials that she must suffer, and that speedily, in the bone structure.

SYMPTOMS.—Usually the first symptom is loss of appetite, the animal instinctively seeking for lime salts. But frequently the first indication of this condition is the occur-

rence of fracture of one of the limb or pelvic bones from some slight cause—as getting up from the recumbent position, slipping, or a blow. Sometimes before these fractures occur, the animal appears to be stiff, and walk as if suffering from delibity, and the joints begin to swell; then the animal lies down and remains in this position, unless strong persuasion is applied.

TREATMENT.—This condition is always more or less serious. Prevention lies in giving pregnant animals good food, keeping them in a healthy state, and not breeding from them when too young.

The curative treatment is simple, and is mainly centered in offering nutritious food rich in lime salts—as crushed oats and beans for Mares, and oats and beans which have been scalded or boiled, with green forage or good hay for Cows. Precipitated Calcium Phosphate, may also be administered in serious cases.

DOSE.—Mare, two drachms: Cow, one-half ounce; Sheep and Pig, one drachm: Bitch, ten grains. Give three times a day.

CONSTIPATION.

Constipation during pregnancy is more frequently met with in those animals which live on flesh—as the Bitch and Cat—than those feeding on herbage.

TREATMENT.—In all animals it may be largely remedied, or altogether removed, by suitable diet and exercise. Purgatives should be avoided, if possible, and only mild laxatives resorted to if necessary. For the Bitch and Cat castor-oil is preferable to other laxatives and raw linseed oil for the larger animals.

DOSE of castor-oil for Bitch and Cat, one ounce. If the constipation is very obstinate and will not yield to the oil, give an injection of warm (not hot) soap suds.

DOSE of raw linseed oil.—Mare, one-half pint: Cow,

one pint; Sheep and Pig, four ounces. The injection as directed for the Bitch and Cat should not be resorted to with the larger pregnant animals unless absolutely necessary, as it might induce abortion.

COLIC.

Colic may appear in some instances during the early months of pregnancy in the Mare, the attacks being generally slight, and occurring at intervals.

TREATMENT.—It is usually the result of indigestion, and only requires simple treatment—as warm gruel, friction to the abdomen, injections of warm water, and laxative food, such as linseed mashes.

DROPSICAL SWELLING OF THE LEGS DURING PREGNANCY (ŒDEMA.)

In some of the coarser breeds of animals and, occasionally in some of the finer, during pregnancy swellings appear around the udder, extending forward as far as the breast and backward and upwards as high as the vulva. The hind legs will begin swelling just above the hoof, and the swelling will extend upward to the hocks or even to the groin. These swellings are serous or watery in character, diminish rapidly during exercise and increase upon rest. The disease is not of much consequence, being caused by deficient circulation occasioned by the pressure of the foetus upon certain blood vessels, for explanation of (see alterations in the womb under pregnancy). It is rarely seen in the Cow, as the circulation of the glands of the udder is more complete than it is in the Mare. In Mares it sometimes appears three or four months previous to foaling; but when at pasture where they can get regular exercise, it rarely occurs.

TREATMENT.—As it depends very much upon the conformation and temperament of the individual animal, as

well as on season and hygienic management, no fear need be entertained, as it disappears in a few days after foaling. Should it occasion any inconvenience, give exercise, and hand-rubbing with the following liniment:

Soft Soap .....one and one-half ounces.
Rain Water (boiled).....five ounces.
Gum Camphor .....one ounce.
Oil of Turpentine.....thirteen ounces.

Mix the Soft Soap with two ounces of the Water; dissolve the Camphor in the Oil of Turpentine; gradually add the Turpentine solution to the Soap solution, stirring constantly until all has been added; then beat with an egg beater until the mixture becomes a thick creamy emulsion; lastly mix with sufficient boiled Rain Water to produce one pint.

EXCESSIVE WATERS (HYDROPS AMNII.)

When there is an unusual secretion of the waters of the womb (fluid amnii), it constitutes what has been termed "dropsy of the amnion."

CAUSES.—It is most frequently met with in poor, badly-fed animals—and particularly in Cows, in which improper hygiene has produced a morbid excitement of the generative organs. Animals which bring forth more than one foetus are much more frequently affected than where only one foetus is present, and it nearly always occurs during the early months of pregnancy; the foetus is generally little developed, and in the majority of instances is dead before it is expelled.

SYMPTOMS.—It is not until the fifth or sixth month of pregnancy, or even later, that indications of this condition are evident. Then the abdomen rapidly enlarges, especially to one side—generally the right; and in a short time it has acquired a greater volume than it has towards the end of gestation. At this period the health becomes deranged, and

colic, with or without wind dropsy (tympanites), is not infrequent. General debility is so marked that the animal can scarcely, if at all, stand; the appetite is lost, rumination is suspended, passing of the urine irregular, dropsical swellings of the limbs and abdomen ensue, with difficult breathing, which increases so quickly in intensity that suffocation is often imminent. The muscular walls of the abdomen have in some cases been ruptured, and the entire mass of the womb, with its contents, has formed a hernia, or rupture. The ordinary period of pregnancy may be completed; or abortion may occur at the seventh or eighth month, when all the indications of such an occurrence are present. The act of parturition will be tedious and slow.

DIAGNOSIS.—The state of the abdomen might lead to the supposition that the case was one of wind dropsy (tympanites), or twin pregnancy. But rectal examination will reveal the immense size of the womb, which forms a great globular mass in the abdominal cavity, and almost completely fills the pelvis, though nothing of a foetus can be detected; while vaginal exploration discovers the neck of the womb cannot be distinguished, the mouth is closed, and the back part of the womb projects more or less into the vagina; pressure on this part of the womb proves that it contains fluid, though usually no foetus can be felt, as it is beyond the touch, and almost lost in the small ocean of fluid surrounding it. It is in rare cases that the mouth of the womb is dilated.

RESULTS.—The occurrence of excessive waters in the womb is nearly always fatal to the foetus. About fifty per cent. of the mothers survive; although, as a rule, the result has been more favorable where assistance was prompt and early.

TREATMENT.—The chief indication is to remove at least a portion of the fluid, by rupturing the membranes surrounding the foetus; this can be easily accomplished with

the fingers if any of the membrane is protruding from the mouth of the womb into the vagina; if the membranes are not in the vagina, and the mouth of the womb is sufficiently dilated for the admission of the hand, they may be ruptured in the womb; if the mouth of the womb is closed it should be gently dilated, and the membranes punctured, if necessary, by means of a trocar and cannula. As soon as the membranes surrounding the foetus are pierced, a gush of fluid takes place, the abdomen diminishes in volume, the womb becomes retracted, and in this retraction the foetus and membranes are sometimes expelled. Should this expulsion not take place soon, they must be removed in the ordinary way. After this, the animal must have good care and a generous amount of food. It must be remembered that the foetus is always dead; and even if it were alive it should be sacrificed, with the view of saving the life of the mother. The chances of success are greater when intervention takes place during the early stage of pregnancy, and before the abdomen is excessively distended, therefore the respiration is not seriously affected, and debility not great.

The excessive waters of the womb have been removed through a puncture in the flank; but this method is not advisable.

PARALYSIS OF THE HIND QUARTERS.
(PARAPLEGIA.)

During pregnancy the Cow is more frequently attacked with paralysis of the hind quarters, than are the other domesticated animals; this usually occurs when near parturition, and often even when that act has commenced; generally, however, it appears six, eight, ten, or twenty days, rarely a month or two, previous to parturition.

CAUSES.—The cause has been said to be the result of the increased weight the creature is called upon to support. It attacks animals which are well fed and tended, as well

as those which receive the opposite treatment. In a locality we may, in certain years, meet with a number of cases; then several consecutive years may elapse without any being noted.

SYMPTOMS.—The paralysis of pregnancy generally appears suddenly and without any premonitory symptoms, manifesting itself with the same intensity at the outset as at a later period; though in rare cases the animal shows a weakness and unsteadiness of the back part of the body and hind limbs for a short time before it drops, and the end of the tail is remarkably flaccid. When paralysis has really set in, the animal is forced to lie, but it does not appear to suffer; the position is natural, the head carried as usual, the eye bright and clear, the muffle damp and cool, and rumination in the majority of instances is not suspended; the pulse, respiration, and appetite are unaltered, and sensation does not seem to be impaired, even in the hind limbs. Constipation is frequently present. It is only when the animal attempts to rise that its condition is evident; the fore limbs and neck can be moved to accomplish this, but the hinder extremities are powerless, or can only be raised to a slight extent; though with help it may be lifted up and can then stand, but unsteady.

RESULT.—Ordinarily, the paralysis persists until parturition, when it disappears. Sometimes it continues until the third day after parturition; and occasionally the paralysis persists for a longer time, and either causes the death or necessitates slaughter of the animal. When paralysis manifests itself only a few days before parturition, the result is usually favorable; but when it makes its appearance toward the seventh or eighth month of pregnancy, the prospect of recovery is not so favorable. If the animal is old or debilitated there is less hope for recovery. A day or two after parturition, if the animal can move the hind limbs and

change its position from one side to another, a favorable issue may be predicted.

This malady must not be confounded with "parturient fever," "milk fever," or "parturient apoplexy," in which we have paralysis, but from which it differs greatly, as the symptoms and results show.

TREATMENT.—It is advisable in most cases to get the animal up, either with or without help; but if it cannot stand, and slinging is not advisable, then it must be made comfortable in the recumbent position, and turned over frequently; peat-moss makes the best bedding. In the majority of cases and especially before parturition, little treatment is necessary. The principal indication is to avert or get rid of constipation by administering raw linseed oil internally, and giving soap suds injections when necessary, and to feed hot mashes and easily digested nourishing food, and keep the animal clean, and quiet. If the paralysis is due to debility, then highly nutritious food with powdered extract of gentian should be given. If the animal evinces tenderness on pressure along the spinal cord, heat should be applied to that region. Should the paralysis persist and the time for parturition be some months distant, it may be necessary to induce abortion, as the protracted recumbent position generally produces external sores of large extent. Should the paralysis continue for any length of time after parturition, more energetic treatment will be necessary. In these cases ,the hypodermic injection of strychnine beneath the skin is nearly always attended with success.

DOSE of Strychnine for hypodermic use.—Mare, three-fourths of a grain; Cow, three-fourths of a grain; Sheep, one-sixth grain; Hog, one-twelfth grain; Dog, one-one-hundred and thirty-third of a grain. Repeat the injection every four or five hours until relieved.

DOSE of Powdered Extract Gentian.—Mare, one drachm; Cow, two drachms; Sheep and Pig, twenty grains;

Bitch and Cat, five grains. Give with the food three times a day.

DOSE of Raw Linseed Oil.—Mare, three-fourths pint; Cow, one and one-half pint; Sheep and Pig, six ounces; Bitch and Cat, one ounce. Repeat the dose every six hours until the bowels move.

CRAMP.

By Cramp is meant an involuntary, and extremely painful contraction of one or more of the muscles. It is sometimes observed during the second half of gestation, especially in the Mare and Cow; it chiefly involves the muscles of the thigh, and the principal extensor muscle.

SYMPTOMS.—The animal either suddenly and rapidly draws up and extends the limb—striking the ground hurriedly and energetically with the foot, as if a fly had settled on the leg, or the whole limb is gradually and rigidly elevated without flexure of the joints, except those of the phalanges, which are half flexed, the front of the hoof being directed towards the ground; at the same time the muscles of the leg are hard, tense, and painful to manipulate, and the animal betrays the torture it experiences by its expression and attiudes. This manifestation is increased if the animal is compelled to walk, its first steps being extremely difficult; while the limb is maintained in a perfectly rigid condition. In a short time these symptoms disappear, and movement is restored. The cramp may pass from one limb to another alternately; it appears to be due to pressure on the sciatic nerve.

TREATMENT.—Cramp is of no moment, and can be relieved by walking the animal for a few paces, or by smart friction. It disappears altogether after parturition.

COUGH.

Cough is a marked symptom of "excessive waters of the womb" (which see). But even when this kind of dropsy is not present, breathing is frequently difficult during pregnancy. This difficult breathing is sometimes accompanied by a very harrassing cough, which, in the larger animals, and particularly the Mare, may lead to injury.

TREATMENT.—Cyanide of Potassium is recommended for the relief of this cough.

DOSE of Cyanide of Potassium.—Mare and Cow, one grain; Sheep and Pig, one-fifth grain; Bitch and Cat, one-tenth grain. Give three times a day until the cough is relieved.

EXCESSIVE AMOUNT OF MILK BEFORE PARTURITION.

This does not demand any attention, unless the udder is large and hard, when it would be beneficial to draw the milk frequently.

ACCIDENTS OF PREGNANCY.

Under this class will be found the following diseases which occur before parturition, and are due to accidental causes—Protrusion (Prolapsus) of the Vagina, Rupture of the Womb, Hemorrhage of the Womb, Abnormal Retention of the Foetus, and Abortion.

PROTRUSION (PROLAPSUS) OF THE VAGINA BEFORE PARTURITION.

Protrusion of the vagina has been most frequently observed in the Cow and Sheep; rarely in the Mare and Bitch. It consists in the protrusion, or pushing backwards, of the vagina by the womb and its contents during pregnancy, the

tumor it forms appearing between, or external to the lips of the vulva. When the tumor is between the lips it is called "incomplete protrusion"; but when it extends out beyond the lips of the vulva, it is termed "complete protrusion." This must not be confounded with "prolapsus of the vagina after parturition."

CAUSES.—Protrusion of the vagina may occur in well shaped animals, whose tissues, especially those of the genital organs, are soft and relaxed, with a wide pelvis, good milkers, and which are fed on an abundance of bulky, but innutritious food. Keeping such animals on a floor sloping too much to the rear, as well as falls, injuries of different kinds, distention of the paunch, fatigue, etc., are all likely to lead to this accident in animals during pregnancy. It occurs most frequently after the third or fourth gestation, although it has been present during the first gestation. The period and duration of its appearance varies.

SYMPTOMS.—The occurrence of protrusion of the vagina is made known by the appearance, at the vulva, of a circular, bright red tumor, depressed in the center, and of a variable, but increasing size as gestation advances—from the volume of a fist to that of the head of a child, or even larger. At first it is only visible when the animal is lying, and disappears when it gets up; but when of considerable volume it never entirely vanishes. If existing for some time, inflammation may be the result, when a large and somewhat dense tumor projects permanently outside the vulva. The color now becomes a darker red, and even dark brown; the tumor may be irritated on the surface from the rubbing of the tail and contact with the dung and urine, while at its upper part can be seen the neck of the womb. This does not seem to incommode the animal, unless it be of an irritable disposition, when straining may take place, and this increasing in intensity, the neck, and even a portion of the

body of the womb, will follow the protruded vagina, and a spontaneous reduction can no longer take place, while manipulation increases the straining. This is in reality now a case of "Prolapsus of the Womb," and an examination of the voluminous mass may lead to the detection of some portion of the foetus in its midst. Frequently the bladder becomes displaced, and when this is distended with urine it will gravely complicate the case and render reduction more difficult.

TREATMENT.—After calving, the vaginal tumor disappears without any treatment being required. But if treatment is necessary, and should the floor of the stall be lower behind than in front, to level it is the first to be done; this may be readily accomplished by means of the bedding. The diet may also require attention, giving that which contains sufficient nutriment in small bulk; constipation should be guarded against, or, if present, remedied by the administration of raw linseed oil. This treatment will be sufficient in the majority of cases.

In serious cases, when the tumor is large and the animal strains, and spontaneous restoration or replacement does not occur when the animal is in a standing position, the mass must be returned. This is readily enough accomplished; but it sometimes happens that restoration does not prevent a continuation of the straining, which will result again in the protrusion of the vagina. This is due to the membrane, which, not having been properly smoothed down when replaced into the cavity, remains in rigid folds which give rise to an uncomfortable sensation, and induce expulsive efforts or straining. In replacing the tumor, it is necessary to cleanse it well with tepid water, and to smooth out the folds of the membrane lining the vagina by gentle pressure forward as far as the neck of the womb, in order to efface these folds, which are a great source of annoyance.

After this a bandage may be applied with a view to keeping the vulva closed, until its lips have retracted somewhat. For illustration and description of the bandage (see Protrusion or Inversion of the Womb, Figs. 67, 68).

In desperate cases, where there is complete protrusion of the vagina, with partial protrusion of the womb, the animal can only be saved by patience and tact of the operator. The animal must be made to stand, with the hind quarters as high as possible (which may be arranged with boards or litter), and to prevent straining the loins should be pressed upon in a forcible manner, by means of a stick placed transversely across the loins, with a man at each end, another holding the tongue and pinching the nose. The protrusion having been cleansed with tepid water, the operator replaces it during the intervals of straining. Having returned the displaced organs into the pelvic cavity, the arm and fist of the operator must follow them, and by pressing on the neck of the womb, so act on the lining membrane of the vagina as to leave no folds or ridges in it; when the straining has ceased, which usually occurs very soon, the arm may be withdrawn. The recurrence of the protrusion must be avoided by the immediate introduction of a ball pessary, for illustration and description of see (ball pessary, Fig. 65). So long as the pessary is worn—and it may be allowed to remain in the vagina for a considerable period—the vagina should be syringed daily with warm water, to which has been added a very little alum. Death is often the result in those cases in which the animal continues to strain and evert the vagina, notwithstanding bandages, pessaries, and other means, and when grave consequences are likely to follow, artificial delivery should be effected without delay; this can readily be accomplished by carefully and gently inserting the fingers into the mouth of the womb, and with the fingers rupture the foetal membranes. There

is no difficulty during parturition as a rule; but care is necessary for some days after to prevent protrusion.

DOSE of Raw Linseed Oil.—Mare, one-half pint; Cow, one pint; Sheep and Pig, four ounces; Bitch and Cat, six drachms. Repeat the dose every six hours until the bowels move.

RUPTURE OF THE WOMB BEFORE PARTURITION.

Rupture of the womb may happen before and during parturition, or in attempts to replace the womb when protrusion has occurred. It has been observed in the Cow, Sheep, Goat, and Bitch; it is not very common before gestation has terminated.

CAUSES.—Thinning of the walls of the womb, dropsy of the womb, and distention by the gas evolved from a putrefying foetus.

SYMPTOMS.—The symptoms of rupture of the womb are not well defined. If the accident is due to external violence, the signs will be in accordance with its severity, and the more serious indications may appear very soon after the rupture, or not for a considerable time. After showing symptoms of colic for a short time, the animal appears to be quite well until parturition is due, when after manifesting signs of parturition, the straining ceases, and the symptoms change to those of inflammation of the bowels—hurried, short and plaintive breathing, quickened pulse, loss of appetite and suspension of rumination, insensibility of surroundings, coldness of body, looking around to sides, etc. Exploration of the vagina may reveal an empty womb, or only a portion of the foetus in it, and the rupture itself may be discovered. Or if the rupture has only ensued when parturition is advanced, the foetus may be expelled in the usual way, and the symptoms of the rupture only recognized when

the birth has been accomplished. The foregoing symptoms refer to longitudinal rupture. Similar symptoms are observed when transverse rupture of the womb has taken place, except that, owing to the twisting of the womb, the hand cannot explore the cavity; the walls of the vagina, however, are found very much relaxed, and the neck of the womb extremely movable in every direction. If the animal survives, the straining soon passes off, the external genitals resume their ordinary appearance, and every indication of pregnancy disappears except the enlarged abdomen, on the floor of which the foetus lies, and there it may become compressed, or in the course of time be eliminated by an ulcerative process set up in the abdominal walls. The mother may thrive, especially if the foetus does not cause any inconvenience or is expelled in some way; and if only one horn of the womb was involved in the rupture, she may again become pregnant.

TREATMENT.---But little can be said as to this. Looking at the serious nature of the accident, it must be a question whether, if pregnancy is about complete and the foetus is alive. To distinguish if there is life, refer to and read (Sensible Signs of Pregnancy). If there is no chance of saving the life of the mother, and the time for parturition is at hand, or nearly so, and the foetus is found to be alive, it is advisable to kill the mother and preserve the young one. If there are any outward signs of abdominal abscess, an incision should be made over the abscess for the elimination of the dead foetus. This surgical interference should be attempted on the chance of the mother surviving.

Though the accident is generally of a most serious character, yet, remembering that the recovery does sometimes take place, there need not be undue haste in destroying the animal.

BLEEDING (HÆMORRHAGE) FROM THE WOMB BEFORE PARTURITION.

Bleeding from the womb during pregnancy, appears to be somewhat rare in animals. It usually manifests itself by a small discharge of blood from the vagina, particularly during urination; this usually results in the death of the foetus. The blood sometimes remains in the womb, as a clotted mass, to the amount of over four gallons. Bleeding from the womb in the majority of cases would seem to be occasioned by a sudden separation of the minute blood vessels of the after-birth from the surface of the womb. This bleeding has been observed in animals which showed signs of "heat" during pregnancy.

TREATMENT.—Apply cold water compresses over the loins and allow to remain for two hours, and plug or pack the vagina with septic cotton; if this is not convenient, clean old linen will answer. If these applications are of no avail, then artificial delivery should be attempted by inserting the fingers into the mouth of the womb, and with the fingers rupture the membrane; the same treatment should be adopted as for bleeding (hemorrhage) after parturition (which see).

ABNORMAL RETENTIUN OF THE FŒTUS.

When speaking of the normal period of gestation, it was remarked, that this varied within considerable limits, and that the foetus might remain in the womb for a comparatively long period beyond the ordinary time, without any serious inconvenience to itself or its bearer. But when, from any special cause, delivery cannot take place, then very grave results may, and, indeed, nearly always, follow. All the domesticated animals may suffer from retention of the

foetus, but the Cow appears to be far more exposed to it than any other.

CAUSES.—A diminution or loss of the contractile power of the womb, making it incapable of expelling its contents; adhesions of an unusual character between the womb and after-birth; malpositions of the foetus; displacement of the womb; deformed pelvis; spasmodic contractions of the neck of the womb; twisting of the womb, or adhesions of its ligaments.

SYMPTOMS AND RESULTS.—Until the period of normal parturition, or even during pregnancy, when abortion is about to take place, there are nearly all the signs of parturition; enlarged udder, swollen vulva, pendulous abdomen, restlessness, and anxiety. Then the straining begins, but the mouth of the womb remains closed and no foetus appears. This condition may persist for only a brief period, and be so little marked as to pass unobserved in some cases; in others it may continue for two, three, or four days, the straining or expulsive efforts diminishing in force and frequency until they altogether disappear. The animal then regains its ordinary state, and, if a Cow, the secretion of milk goes on as if there were nothing the matter. Health may never be impaired from this cause, and the condition of the animal may not be suspected until, if a Cow or a Sheep, it has been fattened and slaughtered by the butcher for food, when the foetus is discovered. After the permanent retention of a foetus, it has been obsrved that "heat" does not appear again in this animal, as a rule.

Sometimes, several months after the period of gestation has been exceeded, signs of parturition are again manifested, and delivery may then be safely accomplished, either without aid, which is rare, or by careful manipulation; the young animal may even be born alive if too long a period has not intervened since the normal time of delivery. Par-

turition in these cases is generally difficult; and the favorable termination of such a condition is due to the foetal membranes not being ruptured, and the mouth of the womb sufficiently contracted to exclude the atmosphere. Even under these circumstances, very often, after fruitless straining, the animal continues unwell; it has little or no appetite, languishes, becomes feeble; hectic fever appears; the animal fails in flesh and strength, and dies after a more or less prolonged period of misery.

When at the usual time of parturition, the straining of the animal has ruptured the foetal membranes and the waters escape, air at the same time obtaining access to the cavity of the womb, the case is in nearly every instance very serious. The foetus soon perishes and begins to putrefy, and in a short time the decomposing mass causes inflammation of the womb (metritis), accompanied by frequent and exceedingly severe straining; low fever takes place; a foul-smelling putrid fluid escapes from the vagina, and the creature finally succumbs to inflammation of the womb and putrid infection. In other instances the termination is not so rapid. The animal remains unhealthy; the secretion of milk is suspended; horribly bad-swelling discharges are passed from the vagina, containing pus, broken-up decomposed tissue, and even bones of the foetus. These discharges are increased by the straining which sometimes takes place at intervals. In the meantime, the creature loses condition, and death ensues from debility and loss of strength. With the Cow there may be a vaginal discharge, due to the presence of a putrefying foetus, and for a long time, without any serious results. It is not the same with the Mare, as death has been the usual termination; but the retention of the foetus is very unusual in this animal. The period during which a foetus may be retained in the womb varies from a few months to five years.

In the case of twins, it sometimes happens that one of them dies, and this occasions symptoms of abortion; but delivery of the dead foetus cannot be effected, owing to the obstruction offered by the living one, which is born at the usual time, the parent being in good health. But days, weeks, or even months after, the remains of the dead foetus may be passed, or have to be extracted from the womb.

TREATMENT.—The treatment of foetal retention must greatly depend upon circumstances. When the owner, discovers an animal that has reached the termination of pregnancy and begins to be in labor, perceives that the straining is weak and irregular, and not sustained, so that birth does not take place after twenty-four, thirty-six, or forty-eight hours, and even when the symptoms of colic are slight, the attendance of an experienced operator should not be delayed.

When some time—days for instance—has elapsed since this stage in parturition was reached, and labor has completely subsided, the case is difficult. A rectal and vaginal exploration should be made, and if it can be ascertained that the foetal membranes are not ruptured, while there is no straining and the condition of the animal is satisfactory, then it will be advisable to wait until indications of labor are once more manifested. If the state of the animal is not so satisfactory and delivery is decided upon, and should the mouth of the womb be impenetrable, or not sufficiently dilated to allow the passage of the foetus, then it must be opened either by careful manipulation of the hand, sponge tents, womb douches, or the womb dilating bag, which will be alluded to and illustrated under Mechanical Dilatation of the Mouth of the Womb (which see).

When a long period has intervened after an attempt at parturition, and the general and local disturbance in the animal necessitates active interference on the part of the opera-

tor, then, of course, the first and most urgent indication is to remove the cause—the putrefying foetus—from the womb. When the mouth of the womb is not sufficiently open to admit the hand and the withdrawal of the foetus, then the case is one of difficult labor, complicated by the death of the foetus and its state of decomposition. (For treatment and manipulation see Difficult Labor.) If the mouth of the womb should chance to be contracted, it must be dilated either by the aforementioned methods, or, if these do not succeed (though they often do), then an incision must be made in the neck of the womb. In very exceptional cases, an operation must be performed on the womb through the abdominal wall (gastro-hysterotomy), if the foetus or its remains are to be got rid of; and in some instances, owing to the air or gas contained in the foetus, its shape or size, or deformity of the genital passage of the mother, it will be necessary to divide the foetus into fragments, and extract it by piecemeal (see Embryotomy). These operations should be attempted only by the experienced Veterinary Surgeon, and not by the Veterinary Practitioner.

When the womb is emptied of all the matters it contains, solid and fluid, it should be thoroughly cleansed by repeated injections or washings with tepid water, and finally with a three per cent. solution of permanganate of potassium, or a solution of carbolic acid (thirty drops of the acid to one pint of tepid water). It is well to remember, that before making explorations or performing operations, the hands of the operator should be cleansed in one of the foregoing solutions.

General treatment of the animal may be necessary, and this must be regulated according to the indications. In all the manipulative operations subsequent to delivery, it will generally be found that care and patience, and, above all things, an absence of undue haste, are commendable, and

we find excellent practitioners recommending abstention, at least for a few hours, according to the circumstances.

ABORTION — MISCARRIAGE.

When pregnancy is interrupted by the expulsion of the ovum, or of the foetus at a stage when this has not attained sufficient development to live external to its parent, Abortion is said to occur; the young creature is either dead when expelled from the womb, or dies immediately afterwards. Abortion must not be confounded with premature birth (which see).

There is not the same tendency or readiness in all the domesticated animals to abort. The Bitch and Cat rarely do so, even after serious injuries; and the Sow retains its foetus almost as tenaciously; but the Sheep and Goat are rather liable to this accident. The Cow and Mare, but more especially the Cow, most frequently lose their foetus. Abortion is much more frequent during the first than the second half of pregnancy, and especially is this the case with the Mare. If abortion occurs at a very early period, the ovum may escape intact and unnoticed, without any disturbance whatever of the health of the female. Abortion is more serious when it happens at a late period; as it then not only causes the loss of the young animal, but it may compromise the value of the mother, or end her existence. The loss to farmers and breeders through their animals aborting is enormous, therefore some space will be given to this accident.

Abortion presents itself in two distinct forms, and for the convenience of the reader, the two forms will be taken up and explained separately: 1. Sporadic, or Accidental Abortion; 2. Enzootic, Epizootic, or Infectious Abortion.

SPORADIC, OR ACCIDENTAL ABORTION.

When cases occur here and there on farms or breeding establishments over a wide extent of country, without any relationship as to causation, it is termed Sporadic, or Accidental Abortion.

CAUSES.—The causes of sporadic abortion are very numerous, and will be arranged as: 1. External Causes: 2. Internal Causes.

1. EXTERNAL CAUSES.—Atmospherical influences, bad weather, or irregular seasons, are predisposing to or cause abortion. There can be no doubt whatever that cold, and especially when suddenly applied to the skin, may produce abortion; and hence it is that the abrupt setting in of cold weather is often marked by miscarriages among animals exposed to it. Many observers have noted that the continued and severe cold of winter is far less frequently productive of abortions than when cold, wet, or frosty nights in autumn succeed fine warm days. Cold rain is sometimes very damaging in this respect.

With regard to food and drink in general, we often have an undoubted cause. Food of bad quality, indigestible, or containing injurious ingredients, is well known to be dangerous. After unfavorable seasons, when forage has not been well dried and made, abortions are of more frequent occurrence. Indigestible food, or that which has a tendency to collect or ferment in the stomach, may, by exerting pressure on the womb, produce abortion. On the other hand, too great an abundance of easily-digested and stimulating food, by inducing a superabundance of blood and consequent congestion of the womb and loosening of the after-birth, has been set down as another cause. Frozen food or water, when taken in immoderate quantity; and especially if the stomach is nearly empty, as well as forage or herbage covered with snow or frost, are also injurious to the larger animals when

pregnant, and abortion often immediately follows. Filthy, putrid water frequently has a destructive influence on gestation. Some plants—such as horse-tails, sedges, etc., also the leaves of beetroot, readily induce abortion. Rue, savin, ergot of rye, and other abortive remedies will have a tendency to cause expulsion of the foetus more or less readily; and poisonous substances, such as cantharides, which act upon the womb, will do the same. Physics, especially those of a drastic kind, are a fertile cause; and opium, digitalis, and some other drugs have to be administered with caution. Ergotized grasses and grains have often produced widespread losses from abortion.

Excessive muscular exertion and unusual traveling is very likely to produce it, and especially if there are indications or a predisposition to abortion; if the exertion is sudden and severe, or even moderate, but coming after a long period of rest, it is all the more certain to produce abortion. Wounds to the abdomen by kicks or falls, or squeezing through a narrow doorway or passage, railway or steamboat traveling, blows and shocks, keeping the animal in stalls with floors that incline backward, are all causes. Access of the male (copulation) not unfrequently produces a miscarriage; and exploration of the vagina will also cause muscular contractions of the womb, which results in the expulsion of the foetus. Surgical operations performed on pregnant animals, bleeding, or throwing a pregnant animal down to be operated upon, is dangerous. Carrying a rider, in the case of the Mare, and especially if the spurs are used, is attended with much risk. Excitement, fear, sudden surprise, or anger, are also causes. Heavy thunder has sometimes been serious in this way; and the fear produced by dogs leads sometimes to heavy losses among Sheep; fox hounds running near or among pregnant Cattle or Sheep often cause considerable damage, especially among nervous animals.

2. INTERNAL CAUSES.—Badly-fed and neglected animals sometimes abort, but not nearly so frequently, perhaps, as those in the opposite condition, and extremely fat. It is generally admitted that with some animals there is a special disposition to abort, and sometimes without any noticeable cause, or a very trifling cause, as previous abortions, will induce abortion; while other animals never lose their foetus, though exposed to the influence of apparently most powerful causes. The disposition to abort sometimes disappears as age advances.

A more constant and potent cause, is to be found in the presence of grave diseases, and especially those which affect the system genrally, producing more or less derangement of all the functions. The various serious epizootic maladies, inflammation of the bowels, and all those abdominal disorders which give rise to restlessness, bloating, cough, as well as those diseases which induce cough—as bronchitis, pneumonia, asthma, etc.—pleurisy, and other affections, and injuries accompanied by great pain; as well as nervous or convulsive derangements—such as lock-jaw, epilepsy, vertigo, etc., are all set down as causes. In acute diseases of the mother, which are attended by fever, the foetus may perish from the abnormal accumulation of heat. Certain virulent disorders, as foot-and-mouth disease, and tuberculosis, may cause the death and expulsion of the foetus. Dropsy of the head, dropsy of the abdomen, and general dropsy, may also lead to the death of the foetus, and is almost a certain determining cause of its expulsion. Faulty formations or relations between the after-birth, malformations of the foetus, malpositions, are other causes. The presence of several foetuses often leads to abortion in the single bearing animals, as the Mare, Cow, and Sheep. Disease of the womb, will be very likely to lead to the premature expulsion of the ovum, or foetus. Inflammation of the womb, as well as new

formations, such as tumors and cancers, also enormous tumors in the abdomen, ovarian dropsy, etc., will predispose to or excite abortion.

Abortion has not unfrequently been ascribed to some defects or other influences in the male, as debility arising from too frequent usage, also poor health. There is abundant evidence that a male enfeebled by too much use, is very likely to be a cause of abortion in the females to which he is put. Abortion has also been said to frequently occur when the male was larger and more powerful than the female. Various injuries, as external violence, may not only injure the womb, so as to produce abortion, but the foetus may sustain bruises and damage. The foetus may be poisoned by food or medicines which do not produce any noticeable effect on the parent.

SYMPTOMS OF SPORADIC, OR ACCIDENTAL ABORTION.—The symptoms of abortion are extremely varied. Abortion may occur without any symptoms or demonstrations so far as the female is concerned: while in others the symptoms indicate a very serious condition. This usually depends on the period of pregnancy at which the accident occurs.

Generally, abortion takes place without any previous indications, and the animal may be as well and lively as usual up to the moment when the foetus is expelled: and the expulsion itself is so sudden, so prompt, and accomplished with so little visible effort or disturbance, that the accident in most cases receives very little, if any, notice. It frequently occurs during the night, and wonder is often expressed at finding in the morning the aborted foetus—generally contained in its intact envelops—lying behind an animal which, on the previous evening looked perfectly well, and even now is so cheerful and unaltered, and its functions so unimpaired, that it can scarcely be believed that it has been the

subject of such a mishap. Even the sentiment of maternity, which is so strongly developed in animals, is not awakened in favor of the expelled foetus, and the mother shows the utmost indifference to it, even treading on it as if it were in no way related to her.

When this simple abortion has taken place during the day, it has been noted that the flank falls in a little, the abdomen descends, the vulva and vagina slightly dilate, and there escapes from them a glutinous (sometimes tinged with blood) fluid, with which the foetus is passed almost without effort. As before mentioned, the ovum or foetus is generally expelled in its intact membranes; this more frequently happens at an early stage of pregnancy. Sometimes, however, the water-bag ruptures at the commencement of abortion, and the embryo or foetus escapes with a small quantity of water, the envelops being rejected soon after; or in some instances they may be retained in the womb, and thus constitute a source of danger, the animal not making any effort to get rid of them. The foregoing are the symptoms of that which is termed SIMPLE ABORTION, and which is most frequently witnessed during the first half of pregnancy. So little disturbance does this kind of abortion cause, that the animal will not require treatment, with the exception of a little care from exposure for several days.

In what is termed LABORIOUS, DIFFICULT, or COMPLICATED SPORADIC ABORTION, which is often due to external causes, such as injuries, the preceding symptoms are generally well marked, and vary somewhat, according as the foetus may be dead or alive. The animal suddenly appears dull and peculiarly dejected; or it is restless, uneasy, and continually moving about; if pregnancy is advanced and the foetus is alive and strong, on watching the abdomen attentively, the movements of the foetus will

be perceived to be frequent, violent, and disordered, but they soon become feeble and infrequent, and cease altogether when the foetus has succumbed. The appetite is lost, a plaintive neigh in the Mare, moan in the Cow, or bleat in the Sheep, is emitted every now and again; the pulse is quick, small, and hard as in haemorrhage; progression is difficult and unsteady, the exppression is anxious, and respiation hurried. When the foetus is alive there is less prostration, and much abdominal pain. The animal often looks anxiously towards the flanks, paws with its fore feet and stamps with its hind ones, moves from side to side, perspires at the flank, breast, and elsewhere; lies down and gets up again, whisks the tail incessantly, and exhibits every indication of increasing restlessness. At the same time the abdomen loses its round shape, and drops; if the animal is in milk, the udder becomes soft and diminished in size more or less rapidly, while the milk secretions diminish; but if the animal is not yielding milk, then, on the contrary, the udders enlarge and become swollen; the vulva is puffed and swollen, and from it escapes a tenacious mucus, streaked with blood, and if the foetus is dead this mucus has a more or less foul odor, according to circumstances. Then follow symptoms analogous to those which characterize normal parturition—the womb begins to contract, and the expiratory muscles act simultaneously with it; the expulsive efforts, or "labour pains," acting more or less energetically and continuously, according to the suddenness of the abortion and the strength and health of the animal. The first result of this straining is the evacuation of the rectum and bladder; the next is the dilatation of the mouth of the womb and protrusion of the foetal membranes into the vagina, then through the vulva, where they appear externally as the "water-bag"; this may rupture and the water escape, and the pains becoming more powerful, the foetus is at last expelled, either nude, or covered by the membranes. This

act occupies a variable period—from a few to many hours, according to the strength of the animal; and it may even require human intervention to bring it to a successful termination. In other instances, however, the foetus is not expelled immediately after it is dead, but after many of the preceding symptoms just described have been manifested; with the cessation of the movements of the foetus the animal regains its ordinary tranquility, appetite, and liveliness, and all the symptoms disappear for one or more days, when they again set in, and the foetus may be rejected without any apparent effort, or after much straining.

In the case of more than one foetus, it may happen that the one nearest the mouth of the womb is dead, and is expelled, the others being alive are retained until pregnancy is complete; or the contrary may occur, the living foetus being next to the mouth of the womb, prevent the escape of the dead one, and these being kept in the womb until the delivery of the others takes place, become compressed, or mummified. When abortion suddenly sets in, and nothing is prepared for its being carried to a successful termination, either on the part of the foetus or the mother, the mother becomes exhausted by ineffectual efforts, and soon passes into a critical condition.

Abortion differs from normal parturition chiefly in the state of the neck of the womb. Towards the termination of pregnancy, this part of the womb becomes gradually shortened and softer; but in abortion we do not have these progressive changes which are so favorable to the passage of the foetus from the cavity of the womb outwards. The neck is long and rigid as in the non-pregnant condition, and its dilatation is therefore slower, more difficult and more incomplete than when gestation has reached its termination. To counterbalance this, there is the small size of the foetus, which does not require so much space for its passage as if

it were full grown; so that the difficulty is less on this account, though the other difficulties we so often encounter in parturition may all be present.

RESULTS OF SPORADIC, OR ACCIDENTAL ABORTION.—Abortion is always a serious accident, if only from the loss of the foetus. It is frequently complicated by bleeding (haemorrhage), which may have been the first cause of the action of the womb; it may also result in rupture of the womb, from the efforts the animal makes to overcome the resistance offered by the neck of that organ; indeed, we may have the usual complications that attend parturition. But in many cases the complications are few and trifling, the animal experiencing very little inconvenience. When the accident occurs in the Cow before the fifth month, the secretion of milk is generally interrupted, often for a year, as the udders have not had time to experience the reflex or sympathetic influence which stimulates them into activity; when, however, it takes place in the last half of pregnancy the secretion may be established, though the yield is usually diminished, and the glands do not furnish their usual quantity until the next pregnancy.

Abortion may produce protrusion or prolapsus of the womb and vagina, and sometimes even of the rectum.

When abortion takes place during the latter half of pregnancy, the foetal membranes are frequently retained, wholly or partially, when the foetus comes away; and owing to the condition of the neck of the womb and its rapid contraction, they are included in the cavity of the womb, and constitute what is termed "retention of the after-birth." This often is a serious complication in the Cow after the first third of pregnancy, the membranes decomposing and giving rise to putrid infection and other alarming conditions.

In the simplest cases of abortion, "heat" appears in the

Cow in from one to two weeks after the miscarriage, and conception may occur then; but frequently impregnation does not take place until after several returns of "heat," and often a whole year elapses before impregnation. In other instances, "heat" does not appear until the full interval of regular pregnancy has elapsed, and then the animal conceives almost as readily as before the mishap. Another very common result is the tendency to abortion after every conception; and with some animals there remains an almost persistent state of "heat," accompanied by barrenness.

DIAGNOSIS.—In the diagnosis we have to determine if abortion is in progress. And to do this in time to prevent it, is not so very easy, although it is very easy to distinguish during or after the expulsion of the foetus. But when abortion first manifests itself, the symptoms attending it are very misleading and might be taken for those of slight colic; many good practitioners have been deceived by the signs and symptoms, and have diagnosticated the case either indigestion, inflammation of the bowels, or some other malady which disappears after the expulsion of the foetus. Such a mistake is unfortunate for the reputation of the practitioner, as well as for the owner of the animal, whose interests suffer: for if a miscarriage had been diagnosticated in proper time it might have been prevented and pregnancy allowed to run its normal course. To prevent such an error, it is well to know that a mistake is possible: so that if called in to attend an animal offering some of the foregoing symptoms, the first inquiry should be as to whether it is pregnant; then the external organs of generation—the vulva and udder—ought to be examined with the greatest care, and the actual symptoms thoroughly taken into consideration. This being done, it will often be found that this is a case of threatened abortion; and that, when taken in time, the abortion can be averted by prompt and proper treatment. L. of C.

It may happen that information is required as to whether abortion has occurred in the animal. In the absence of the foetus or its envelops, such a question is not easily answered; and the difficulty is increased if the foetus is undeveloped, and a long interval has elapsed since the supposed date of the suspected abortion; and after the fifteenth day it is almost impossible to assert with absolute certainty that abortion has occurred, the generative organs having at that date resumed their ordinary condition. Therefore, it is only by an early inspection of these that we can enlighten ourselves as to what may have taken place. In this inspection is included that of the udders, which are always a little swollen, hard, and painful, and often yield a small quantity of milk after a recent abortion; the tail, the hair of which is soiled and matted by blood, mucus, and the waters; the vulva, which is swollen and dilated, and its membranes often presents, in addition to its uniform and more or less deep-red color, spots due to the rubbing or bruising it experiences during the passage of the foetus. On carefully exploring the vagina, if the neck of the womb is found to be softer than usual and the mouth of the womb partially open, and better still, if the hand can be introduced without much difficulty into the cavity of the womb, and a quantity of bloody fluid, or fluid streaked with blood, or remains of foetal membranes, is discovered in the womb, it may be concluded that a foetus has been recently expelled.

TREATMENT IN SPORADIC, OR ACCIDENTAL ABORTION.—With regard to preventive treatment, this must mainly depend upon a knowledge of the causes which produce abortion (see causes of abortion, also hygiene of pregnancy). With regard to animals which have a predisposition to abortion, they should not be bred from. But if it is desired to breed from them, if they are Cows, they must not be put frequently to the male, and certainly not before

eighteen months or two years have elapsed since the last abortion. When pregnancy has again occurred, every precaution should be observed to continue it to a successful termination, by avoiding or removing those causes which previously induced abortion in the animal, also the general health should be attended to, therefore combating an overabundance of flesh and blood on one hand, or a debilitated condition on the other; guarding against constipation by giving proper food and administering mild physics, as small doses of raw linseed oil; also guarding against irritation. Should there be slight irritations, or any indications of abortion, whether general or of the womb, administer laudanum by the rectum; and allow only gentle exercise towards the end of pregnancy.

DOSE OF LAUDANUM.—Mare, one drachm; Cow, two drachms; Sheep and Pig, ten drops. Mix the laudanum with not more than a wine-glassful of warm water, and inject into the rectum. Repeat the injection every two hours if necessary, until three injections have been given. With the Bitch, give three drops of laudanum by the mouth, every two hours, if necessary, until three doses have been given.

When abortion appears to be close at hand, active and prompt intervention generally becomes necessary in order to avert it. Therefore it must be accurately distinguished if the foetus is alive or dead. (To prepare yourself for this difficulty, carefully read Signs of Pregnancy; especially the Sensible Signs of Pregnancy, in another part of this treatise.) If the foetus is found to be alive, and the membranes are not ruptured, and labor pains have been few and not severe, the abortion may be checked or prevented by keeping the animal in the most perfect quiet possible—alone in a darkened place, with doors and windows closed, if convenient, and the administration of narcotics. The narcotic may be laudanum, chloral hydrate, or chloroform. Laudanum is preferable and should be given as follows:

DOSE OF LAUDANUM.—Mare and Cow, one and one-half drachms; Sheep and Pig, twenty drops. Mix in not more than a wine-glassful of tepid water, and give by the rectum in the form of an injection. Repeat the injection in half an hour, if necessary, and thereafter every hour until the pain and straining have subsided.

Some authorities prefer chloroform and assert that it has yielded extraordinary results in abortion cases, by suddenly arresting the straining.

DOSE OF CHLOROFORM TO PREVENT ABORTION.—Mare and Cow, two drachms; Sheep and Pig, twenty drops; Bitch, ten drops. As chloroform is very volatile it will be necessary to mix it quickly with three or four ounces of sweet oil and give at once by the mouth as a draught. Repeat the dose in half an hour if necessary, and every hour thereafter until the pain and straining subsides.

After the administration or either laudanum or chloroform, the abdomen should be gently rubbed for some time, and the stall well bedded; and if the animal will eat and drink, allow only small quantities of gruel for one or two days, or until all danger has passed, when it may be gradually put upon ordinary diet, and allowed to resume slow and light occupation.

If the foetus is found to be dead, or if the foetus is alive and the foetal membranes are ruptured, which is indicated by the escape of the waters, abortion is inevitable, and there are no means of preventing the expulsion of the foetus; the object must then be to favor the expulsion of the foetus as speedily as possible, and remove the envelops, should there be any likelihood of their being retained in the womb. In the majority of cases, active intervention is of but little value, and is only to be recommended when the labour is slow and tedious, and the animal is becoming exhausted by fruitless straining, or when labour is altogether

suspended after the escape of the "waters." When intervention is decided upon, oil the hand and with it remove all the dung from the rectum; then cleanse the hand with tepid water, and finally with a solution of carbolic acid (thirty drops of the acid to one pint of water); now oil the hand with clean oil—as sweet oil, or fresh lard—and carefully introduce the oiled hand into the vagina, and if the mouth of the womb is found to be contracted or not sufficiently open to admit the hand, it must be gently dilated by the index or other fingers, until the interior of the womb can be reached, when the foetus is to be seized and removed in the usual way; should it be in a wrong position, or should there be any obstacles to its egress, then we must proceed according to directions given in abnormal presentations of the foetus. In abortion the foetus being small, we seldom encounter any difficulties from this cause.

If it should happen that the neck of the womb is contracted, and shows no sign of yielding to gentle manipulation of the fingers, then measures should be adopted to relax it. For this purpose belladonna ointment will be found to be very serviceable; take of the powdered extract of belladonna one part, to four parts of lard; mix, and introduce into the vagina, and with the hand apply around the neck of the womb. Should this fail, other means must be resorted to, as described under Mechanical Dilatation of the Mouth of the Womb. If the passage has become dry after the escape of the "waters," injections of glycerine will be found beneficial. Powdered extract of belladonna should be administered internally, particularly if the animal is exhausted.

DOSE OF POWDERED EXTRACT OF BELLADONNA.—Mare and Cow, ten grains: Sheep and Pig, two grains;Bitch, one-eighth grain. Repeat the dose every six hours until the animal is relieved. Gruel, beef-tea, milk, or other strengthening fluids will also be required.

If the membranes come away with the foetus, there is little more to be done; though in the contrary case, which frequently occurs in abortion as well as premature birth, the membranes are strongly adherent to the after-birth of the womb, and their retention, particularly in Cattle, is often troublesome. Some practitioners prefer to remove these membranes immediately by carefully separating them with the hand; and this is easily accomplished so long as the mouth of the womb is dilated, which it usually is for three days after delivery. Other practitioners prefer to wait for nature's assistance, and only provide the following simple precautions: When they find the membranes firmly adherent, and their separation from the womb likely to be attended with inconvenience, as well as injury, they only partially detach them, then collect and twist them into a rope-like form, and leave the mass protruding through the mouth of the womb, in the vagina; so that should the neck of the womb contract, this rope-like mass can be gently pulled, which will not only assist in the expulsion of the membranes, but will excite the muscles of the womb to action and causing that organ to renew its efforts of expulsion. In a short time the after-birth becomes loosened and is then readily removed by gentle pulling of the rope mass. However, caution must be used in pulling this rope, or it will tear and become severed from the main portion. (Also read Retention of the Foetal Envelops or After-birth.) A few experienced practitioners rely on internal medicine for the separation of the after-birth and the membranes. One of them, has long and successfully administered the following:

Powdered Laurel Berries, one and three-fourths ounce.
Bicarbonate of Soda .....one ounce.
Infusion of Fennel .....half pint.

Mix and give as a drench at one dose to the Mare and Cow; give one-half as a dose to the Sheep and Pig, and one-third to the Bitch and Cat. Repeat the dose three times a day until the membranes pass away, which will usually take place on the second or third day. Also give to the Mare and Cow about eight or ten pints a day of a decoction of the meal of linseed-cake until the membranes have passed. Give proportionately to other animals.

An animal which has aborted requires attention after the delivery of the foetus. It should be kept clean, fed on gruel and easily digested food, though not in excess; kept from draughts of air, particularly in cold weather, and nursed for some days. The complications which sometimes accompany this accident are the same as those of normal parturition, and will be alluded to under that subject (which see). The animal should not be allowed to become impregnated at the next period of heat, and perhaps better if not at the succeeding period.

EPIZOOTIC, ENZOOTIC, OR INFECTIOUS ABORTION.

This differs from sporadic, or accidental abotion particularly from its attacking all, or nearly all, the pregnant animals (especially the Cows) on a farm or pasture, over a wide district, or even throughout an entire country, for perhaps a succession of years—thus constituting itself a veritable scourge to agriculture. In the United States, it has proved a scourge in some of the horse producing regions, where it seems to have made its appearance in recent years. It is only since 1866 that it has attracted attention in the Mississippi Valley, and gradually increasing in sever-

ity, in 1889 and 1890 it caused great havoc—the losses through Mares aborting amounting to as many as 75 per cent. in some regions; in others, one-half of the Mares aborted. The Horse-breeding areas in Illinois and adjoining states suffered most. In Kentucky in 1892, it was reported that 75 per cent. of the brood Mares were either barren or had lost their Foals that spring. And since that date infectious abortion has given more or less trouble in different sections of the United States.

CAUSES OF EPIZOOTIC, ENZOOTIC, OR INFECTIOUS ABORTION.—So long ago as the end of the last century, contagion or infection was believed to play the principal, if not the sole part in many outbreaks; for it was observed that when a Cow aborted in a place where other pregnant Cows were kept, these would abort in succession until all, or nearly all, had miscarried. Not only this, but it has often happened that a newly purchased Cow-in-calf has been introduced into a farm where the Cows had already calved favorably at the proper time; and when the stranger has aborted, first one, then another, then a third, and so on, of the others have experienced the same misfortune, and the malady has persisted in the place for consecutive years. Again, when pregnant Cows which were living in a place where the disease had not existed, have been introduced into a stable where it prevails, those that are at the end of gestation calve regularly and normally; but if they are a certain time in the infected stable before this period is reached, they abort like the others. The bad hygiene of cowsheds and stables appear to have no influence on abortion, as it appears quite as severely and readily in those which are well ventilated and cleansed as in those in the opposite conditions; in fact, nothing can so well explain the occurrence of particular outbreaks of epizootic or infectious abortion as the presence of a contagious or miasmatic infection.

It has been proven and established by microscopical investigation, that on the lining membrane of the vagina and vulva there is constantly found a minute fungus mixed with the mucus, which is a kind of bacilli or microbe. Towards the period of parturition these bodies become extraordinarily abundant, and they seem to cause the decomposition of the foetal membranes and their expulsion; when the after-birth and membranes are retained and putrefy in the womb, these microbes are extremely numerous. It has been asserted that it is sufficient to introduce into the vagina some of these microbes or bacteria, which will multiply there, and penetrating to the womb, commence their work of decomposition, to produce abortion. In cases where these microbes were inocculated in Cows which were pregnant from five to seven months, in twelve, fourteen, and twenty-one days after the inocculation they aborted. It has also been shown that by smearing the canal of the vagina of a pregnant animal to a certain depth with the matter from the expelled membranes of one which has been delivered, abortion can be induced.

There is sufficient proof that infectious abortion is caused by a specific germ or microbe that, when transmitted from an animal that has aborted, or from the aborted foetus or its envelops, to another pregnant animal of the same species, will cause it to abort. The microbe may obtain introduction to the genital passage through actual contact with these matters, or the air may carry it to them when the discharges have become dried.

In the animal which has aborted the previous year, and is afterward barren, a mixed variety of microbes will be found, while the matter obtained by scraping the lining membrane of the womb gives a slightly acid reaction which is undoubtedly the cause of the animal being incapable of impregnation; as the male generative germ (spermatozoa) cannot retain vitality in other than an alkaline medium.

SYMPTOMS OF EPIZOOTIC, ENZOOTIC, OR INFECTIOUS ABORTION.—It is rare that this kind of abortion occurs before the first third of pregnancy has passed; more frequently it occurs during the second half of pregnancy. There are no premonitory symptoms, except perhaps a trifling uneasiness for a few hours previous, with sinking of the flanks and descent of the abdomen; the animal generally looks well and hearty, and yields its supply of milk as usual; and soon after the foetus is expelled, apparently without any effort or inconvenience, and along with its membranes, if these are not ruptured, with or without them when they are ruptured. It is rare, however, that the ruptured membranes are rejected immediately after the foetus; as a rule they are nearly always retained, particularly when pregnancy is advanced; when they are retained they putrefy in the womb, being got rid of only in shreds at intervals. When attempts are made to remove them by hand, this is found much more difficult than after ordinary parturition; owing to the membranes being very adherent. When the membranes come away slowly, the animal generally loses in appetite and condition, goes off its milk, and sometimes perishes. If the animal recovers, "heat" appears unnaturally frequent, though conception is infrequent and barrenness common; and on the other hand, there are some animals which expel the membranes quickly, conceive soon after, but again abort as readily—perhaps three times in the course of a year.

The foetus is usually dead, though when it is expelled during the second half of pregnancy it may be alive; but it is weakly and soon dies, even when born near the termination of pregnancy. These newly born animals make a rattling noise when breathing, accompanied by the discharge of a rusty-colored mucilaginous fluid from the nostrils; they are attacked by diarrhoea, and are always emaciated and flabby, the gums and palate being pale.

As has been stated, all the animals on a pasture or in a shed where the disease prevails, do not abort at the same time, but at intervals. When one aborts, another appears to prepare for the event, which may occur in about eight days; then some days after this it is the turn of another, and so on until two-thirds, or perhaps even all, of the pregnant animals beyond the first third of gestation have aborted. It has also been mentioned that it is only after being some time in sheds in which the disease is present, that newly purchased animals are attacked; those which are nearing parturition escape abortion. There are instances recorded in which a pregnant Cow, leaving a shed in which abortion prevailed, and transferred to another where the accident had not been seen, would remain all right for some time, then suddenly miscarry, and in the course of about fifteen days other abortions would occur in this shed—therefore the danger of keeping pregnant animals in contact with or in proximity to those which have miscarried in this way. It has also been stated that an animal which aborts either remains barren, or has always a tendency to abort again. But it has been observed, especially in cows, that if they are well fed, the period that elapses after each abortion is often longer; so that if a Cow aborts the first time at six months, it will do so the second time at the seventh month, and the third time a little before the ninth month, reaching its full period in three pregnancies.

One of the peculiarities of infectious abortion in the Mare which is not so perceptible in the other domesticated animals is, that very often nothing at all is noticed, the animal appearing in as good health as usual; in other instances there is uneasiness, which might pass without attracting much attention. Very often the first indication observed is the return of "heat" in Mares supposed to be some months pregnant; and the animals being at pasture, the expelled

foetus escapes detection, until in some of the Mares pregnancy has considerably advanced, when the size of the abortions lead to the discovery that the disease is rife. The Foals that live for a short time have inflammation of the joints, which often run on to suppuration.

TREATMENT FOR EPIZOOTIC, ENZOOTIC, OR INFECTIOUS ABORTION.—If the malady is suspected to be due to any one particular cause, or if there exists predisposing causes, then the indications for the prevention or cure of this accident are obvious. In the debilitated state which seems to favor the occurrence of infectious abortion in or after certain rainy seasons, should be remedied by good food and tonics, especially is copperas (ferri sulphate) a serviceable tonic in a debilitated state as well as when abortion is due to ergotized food.

DOSE OF COPPERAS.—Mare, one drachm; Cow, two drachms; Sheep and Pig, twenty grains; Bitch and Cat, one grain. To be given three times a day mixed with the food.

In cattle-sheds where Cows aborted year after year, Brauer has employed carbolic acid with the most marked success. He gave it to Cows which were from five to seven months pregnant, by subcutaneous (hypodermic) injection in the neighborhood of the flank, the dose being two Pravaz syringefuls of a two per cent. solution of the acid.

If, however, abortion is due to the presence of microbes transferred from an infected animal, or from something which has belonged to an affected animal—then the first and fundamental indication is to remove or isolate the source of the mischief. When, therefore, abortion occurs, and there is reason to believe that this accident is in its nature infectious, the foetus and all pertaining to it should be removed as promptly and completely as possible from the shed or place in which the abortion has occurred. The ani-

mal itself should also be removed—or, better still, the other pregnant animals in the same barn or shed should be moved away to another building—and either kept altogether isolated, or at least away from all other pregnant animals. The animal which has aborted should have a special attendant: this attendant should not go near the unaffected pregnant animals, and the excretions from this animal should be carefully kept out of the way of the other animals. The place in which the abortion has occurred, and especially if it contains more pregnant animals, ought to be immediately cleared of all manure and other matters of an objectionable kind, the drains and the floor—particularly that of the stall which has been occupied by the animal which has aborted—being thoroughly swilled with water, and sprinkled with lime and sulphur, to which has been added a very small quantity of carbolic acid; the walls should also be lime-washed; a good layer of straw may then be laid down, and the animals replaced. The stables should be kept clean and well ventilated for a number of days, and the drains well flushed and disinfected with lime and carbolic acid.

The animal which has aborted must also at once be attended to. If the membranes have not been discharged, they should be removed as early as possible, and not allowed to putrefy; their removal should be effected by the hand, the same as in sporadic abortion (which see). After the removal of the membranes inject the following solution into the vagina and womb:

Carbolic Acid .....thirty drops.
Water (warm) .....one pint.

And with a 5 per cent. solution of carbolic acid sponge thoroughly about the vulva, over the tail and down the back part of the thighs. The membranes themselves must be destroyed or buried, and the animal should not be allowed to go near others which are pregnant so long as there is any

discharge from the vulva; for safety, the period of isolation should extend at least to from eight to fifteen days. The animal may require good nursing in the meantime; and it should not be put to the male until every trace of irritation in the generative organs has disappeared. If animals show any symptoms of impending abortion ,they ought to be promptly removed from the vicinity of others which are pregnant.

The following precautionary treatment, wherever adopted, has been found exceedingly successful, in stables where abortion among animals is frequent: 1. Once a week the stables are to be well cleansed, particularly behind the animals, and then sprinkled with a strong solution of sulphate of copper, or of carbolic acid—one part to fifty of water. 2. The tail, anus, vulva, and thence downwards to the hoofs of the hind limbs of every animal inhabiting these infected stables, to be sponged with the following preparation:

Distilled or Rain Water.....two gallons.
Hydrochloric Acid.....two and one-half ounces.
Corrosive Sublimate...two and one-half drachms.

These ingredients to be thoroughly mixed; and as the preparation is poisonous to man and beast, care must be taken.

Foals affected with joint-disease (this being considered of the same nature as that which leads to abortion, and capable of producing that accident) should be destroyed and their bodies burnt; if, however, the foal is suffered to live, it should be separated from pregnant Mares before the swellings have suppurated or become sores. All Mares dams of Foals with affected joints, should be subjected to the same antiseptic treatment as if they had aborted.

Should abortion be traced to the food—ergotized or otherwise damaged fodder, or water, of course the use of

this must, if possible, be prohibited, and a change resorted to. If the pasture grasses are ergotized, then the pregnant animals, as a matter of precaution, should be removed from them, and placed in more favorable conditions with regard to food. It may be remarked ergotized or mouldy dry forage may be rendered safe for consumption by scalding it with boiling water or steam, or pickling it in salt.

It should not be forgotten that, whether abortion be due to casual causes or to a virulent microbe, and whenever or wherever the accident occurs—whether at pasture, in strawyard, shed, or stable—the greatest possible care should be taken to isolate the animal, if it is with pregnant animals of the same species, and to bury everything—foetus, membranes, etc., as well as to destroy all traces of discharges

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NORMAL PARTURITION—NATURAL BIRTH—NATURAL LABOR ORNATURAL DELIVERY.

NORMAL, NATURAL PARTURITION, or BIRTH is the expulsion of the foetus from the womb through the maternal passages, by natural forces, when it is sufficiently developed to live external to its parent. This act is designated "foaling" when occuring in the Mare, "calving" in the Cow, "lambing" in the Sheep, "pupping" in the Bitch, etc. It receives the designation of "normal," "natural," when it is accomplished in a manner favorable to the parent and offspring by natural forces alone, without foreign assistance. Parturition even when natural, is accompanied by pain, general disturbance and uneasiness, and violent efforts. And during birth nature does not appear to obey those immutable laws so strictly as in the accomplishment of other physiological acts, but makes frequent and wide deviations; though these do not often compromise the final

result. We never find two births exactly alike, but each offers something peculiar when attentively observed.

CAUSES OF PARTURITION.—Though parturition only occurs at the end of pregnancy, nevertheless this act is being prepared for from an early period in the development of the ovum. During the evolution and development of the ovum, the womb increases in a corresponding manner, and its muscular structure is proportionately augmented. When, towards the termination of pregnancy, the ovum has reached maturity, and the organs necessary for the independent existence of the foetus are completely developed, certain alterations occur, both in the womb and the foetal connections with it, which bring about the expulsion of the young creature.

These alterations would appear to consist in a gradually increasing fatty degeneration of the membranes, which are gradually destroyed by a regressive process in the cells lying between them; while the blood which was sent to the womb is now diverted towards the udder, for the secretion of milk. The exchange of materials between the womb and foetus is lessened: the foetus is always more or less of a parasite, but with its greatly augmented weight and volume it becomes like a foreign body in the cavity of the womb, which aids in the change. At all the places where the cell degeneration has reached a certain stage, the termination of the nerves are irritated. But to obtain a reflex action, and consequent contraction of the muscles of the womb, a certain amount of continuous irritation is necessary. This sum once obtained, a reflex action takes place in the form of a contraction, which, however, is slight at the beginning. Then a pause follows, until the sum of the irritation is again sufficient to cause a contraction. By the increase in intensity of the contractions the wall of the womb is removed from the foetal envelops or

membranes, and this separation becomes a new source of irritation to the nerve-fibers of the womb. The reflex action, in the form of labor-pains, becomes more and more powerful, until these follow at last in rapid succession and complete the expulsion of the young creature.

EXPELLING POWERS IN NATURAL PARTURITION, OR LABOUR.—The expulsive force by which parturition is effected resides in the muscular fibers of the womb; these cause the womb to contract in a rhythmical and involuntary manner, the contraction of the abdominal muscles being merely auxiliary. Expulsion is not effected by one contraction, but by a series of contractions, which are accompanied by pain and designated "labour pains"; between each of these there is an interval of apparent repose, during which the womb seems to be gathering strength for a new effort. At the commencement, corresponding to the slight irritation, the contraction is feeble and short, and the time required to obtain the necessary sum of irritation for a new reflex action is comparatively long; though the walls of the womb are not relaxed on their contents. As parturition progresses, and the separation between the womb and foetus increases, the irritation becomes stronger and the intervals between the contractions shorter, while the labour pains become more intense and of longer duration.

At the first, and second stage of parturition, the whole of the womb contracts during each regular pain. The horns of the womb likewise contract; they are twisted on themselves, are shortened through the action of the muscles, and are brought nearer the body of the womb, which is also shortened; and as this shortening is always taking place in the direction of the neck of the womb, it is here that the sum total of the expelling force is centered; and it is this force, commencing to operate at the body of the womb, and

exerted on the "water bag," which gradually opens the mouth of the womb for the extrusion or thrusting out of the foetus. The foetus with its envelops, first acts as a stimulus to the womb, but they soon begin to play quite a mechanical part in the dilatation of the already greatly shortened neck of the womb, which becomes thinner as the contractions force the bag of waters against it; so that the mouth of the womb is gradually widened, and the neck really becomes a part of the womb cavity. As soon as the mouth of the womb is slightly opened, the bag of waters enters it and acts as a mechanical dilator; then the lower parts of the fore limbs, succeeded by the head of the foetus, are introduced, and from their combined shape act like a wedge, until, by the irregular pressure, the chest is passed in, and the neck of the womb being drawn over the presenting parts, the mouth of the womb is of the same diameter as the vagina, which then, with the womb, constitutes one common cavity.

If the womb of single bearing animals contain two foetuses, the two horns of the womb are about the same size, each having a foetus in the same position as if there were only one in the cavity of the womb. In general, the two foetuses present the fore limbs, although it sometimes happens that the second or the first, or even both, present posteriorly; frequently the second foetus makes a mal-presentation. In twin births, parturition is more difficult and slower than when there is only one; another feature in twin pregnancies is that parturition often occurs before the ordinary time; and even when this has been reached, usually one or both foetuses are smaller and weaker than when there is only a single foetus. When twin parturition sets in, the womb contraction commences almost simultaneously in both horns; but as the two foetuses cannot be born together, that which is most advanced is delivered first, the other, which is behind it, mechanically aiding in its expulsion. In

the Mare the interval between the birth of twins is rarely more than ten minutes; with the Cow it may be one or two hours; and with the Ewe half an hour. When the position of the second foetus is favorable, it is usually expelled more rapidly and easily than the first. When the number of foetuses are greater than two, they are also expelled at intervals.

With the small multiparous animals, in which the foetuses are expelled one after another, each fraction of the womb coresponding to a foetus contracts in turn—at first the segment of one of the horns nearest the neck of the womb, then the next segment, and so on until the one in the region of the ovary is reached, so as to get rid of all successively; although the contractions of the womb are general, they are more energetic at the portions intermediate to the foetuses.

Fig. 14.
DILATOR OF THE NECK OF THE WOMB.

The contractions of the womb are very powerful. They are always more continuous and energetic in the Mare than in the Cow. Frequently they are more powerful in weak-looking animals than in those which are robust and vigorous; their energy depending upon the muscular structure of the womb.

After the complete dilatation of the mouth of the womb, the third stage of delivery begins; the resistance is no longer at the neck of the womb, but in the womb itself, and now the muscles of that organ come into action, in order to diminish the cavity of the womb and quite expel its contents. In this they are greatly aided by the abdominal muscles, which until now could assist but little; the animal strains, as in voiding dung or urine, but with all its force;

and these efforts in which nearly all the muscles of the trunk share, soon bring labour to a termination.

SIGNS AND COURSE OF NORMAL PARTURITION, OR LABOUR.

For convenience and facility of description and study, the entire period of labour will be divided into four stages, or periods: 1. Preliminary Stage; 2. Dilatation of the Mouth of the Womb; 3. Expulsion of the Foetus; 4. Expulsion of the Membranes.

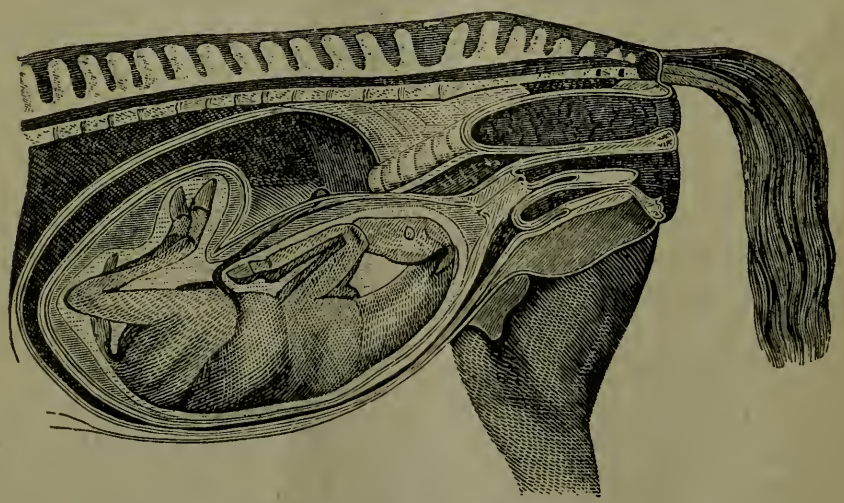

Fig. 15.

NORMAL POSITION OF THE FOETUS IN THE MARE AT THE FIRST STAGE OF PARTURITION.

1. SIGNS AND COURSE OF THE PRELIMINARY STAGE OF NORMAL LABOUR.—One of the most important signs is the enlargement and increased sensibility of the udders to which the excess of blood no longer required in the womb is directed. These glands become voluminous, hard and tender; and these signs are more remarkable in those animals whose milk is not utilized after the young have been weaned. In the Mare and Ewe, the

udders, ordinarily small and scarcely perceptible, before parturition they become so remarkably developed as to cause alarm in people who do not understand the cause. With the Mare especially, the development of the udder is sometimes so great, that the enlargement extends along the surface of the belly and has the appearance of a watery swelling; or it ascends between the thighs as high as the vulva as a prominent ridge, while the skin in the region generally looks reddened. At a later period, the teat yields a watery fluid or pressure, which afterwards becomes the "colostrum" or first milk.

Another preliminary sign is the increase of space between the lips of the vulva, which become soft and flabby, while their lining membrane is reddened, and a glairy mucus covers it. This mucus soon becomes so abundant that it is discharged in long, thread-like streams, particularly in the Cow, and soils the tail and hocks; it is destined to lubricate the genital passages, and facilitate the extrusion of the foetus. With these changes the abdomen falls, or rather, becomes more pendent; the croup and flanks look hollow. due to the relaxation of the broad ligaments. The spine in the lumbar region inclines downward, as if yielding to the weight of the abdomen. The haunches appear to be wider apart. The animal walks sluggishly and unwillingly, and if grazing with others does not appear to care about following them. Sometimes there is swelling of the limbs, particularly the hind ones. If very careful exploration or examination of the vagina be made at this time, it will be found that the neck of the womb has become a part of the womb cavity, being reduced to merely a thin circular ring; it is soft to the touch, and the mouth of the womb is slightly open in those animals which have previously had young.

As parturition draws nearer, these signs are more marked. The animal also begins to be restless, and con-

tinually agitated; if feeding it stops for some moments, as if listening to some sound only audible to itself, or as if experiencing some strange internal sensation for the first time, which undoubtedly is the commencing contractions of the womb. Frequently the animal lies down and gets up again, as if suffering from colic. Some are quite mute, though anxious and uneasy; while others, in addition to exhibiting restlessness and distress, utter a half-stifled cry of pain. The Mare whisks its tail, the Cow bellows, the Ewe bleats, the Bitch often whines, and the Cat emits a low cry as if in suffering. If the animal is at liberty it seeks a remote quiet place in which to bring forth its young, and the Bitch, Cat, Sow, and Rabbit prepare a special nest.

SECOND STAGE OF NATURAL LABOR; DILATATION OF THE MOUTH OF THE WOMB.—This is marked by increasing uneasiness of the animal; pawing, lying down and rising frequently in a kind of aimless fashion, while the expression of the face betrays suffering. When the contractions of the womb really commence, the creature suddenly stops, as if surprised by pain; its eye looks animated and expresses anguish; the skin is hot, pulse quickened, the abdominal walls are rigid and contracted, the flank is tense, and very frequently dung or urine are voided. During pain at this period, if the neck of the womb is examined, it will be found that its border has a tendency to become hard and prominent. When the pain has passed, calm succeeds; the neck of the womb becomes thick and elastic, and the mouth of the womb is markedly enlarged. Each pain lasts for some seconds to two or three minutes, the interval of quiet continuing to about fifteen minutes at first; though the interval diminishes when the contractions become more frequent, energetic, and prolonged. Then the foetal membranes begin to be detached from the inner surface of the womb and enter the mouth, whence they pass into the vagina and between the lips of the vulva, where

they appear externally as the "water-bag." In the meantime, the fore limbs and the nose and head of the foetus enter the mouth of th womb, and dilate it to its fullest etxent, when the caviy of the womb forms a canal continuous with the vagina.

THIRD STAGE OF NATURAL LABOR: EXPULSION OF THE FOETUS.—The pains become more severe, frequent and sustained, and to the muscular contractions of the womb are added those of the abdominal and

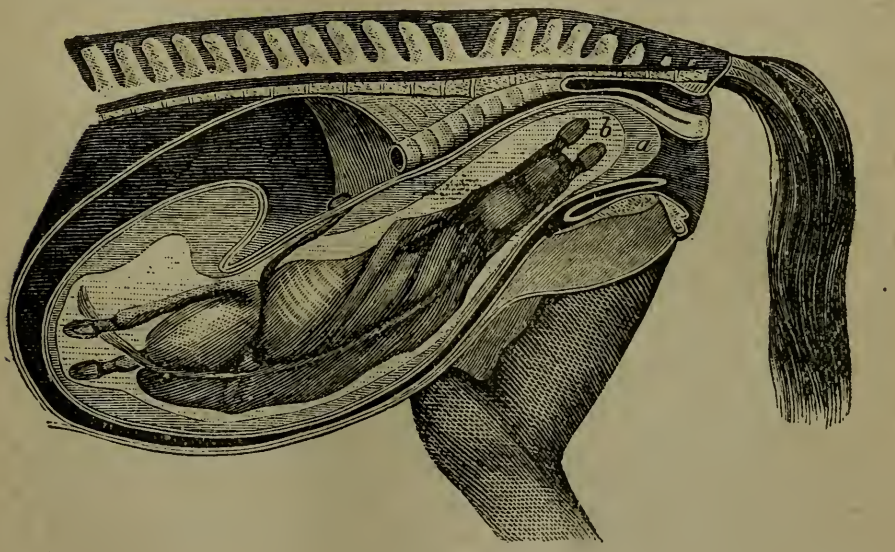

Fig. 16.

NORMAL POSITION OF THE FOETUS IN THE MARE AT THE SECOND STAGE OF PARTURITION.

a, First or Outer Water-bag (Allantois); b, Second Water-bag (Amnion).

other muscles. If the animal is standing, it brings all its limbs under the body, arches the back, elevates the tail, slightly flexes the hocks, takes a deep breath, and by a powerful contraction of all the muscles of the trunk, it brings such an amount of pressure to bear on the foetus as to propel it into the pelvic cavity. The "water-bag" which protrudes beyond the vulva, increases in volume at

each contraction of the womb. The size of the "water-bag" varies in different animals; being in the Cow about as large as the bladder of a Pig, and in the Bitch the size of the carp's swimming bladder. The "water-bag" is much slower to rupture in the Mare than in the Cow, and it frequently happens that the Foal is born in the "bag" without rupture taking place. When the rupture takes place late it is more favorable than when it occurs early. When rupture occurs too early, and before the foetus has been sufficiently expelled, the parts become dry, and labour is always longer

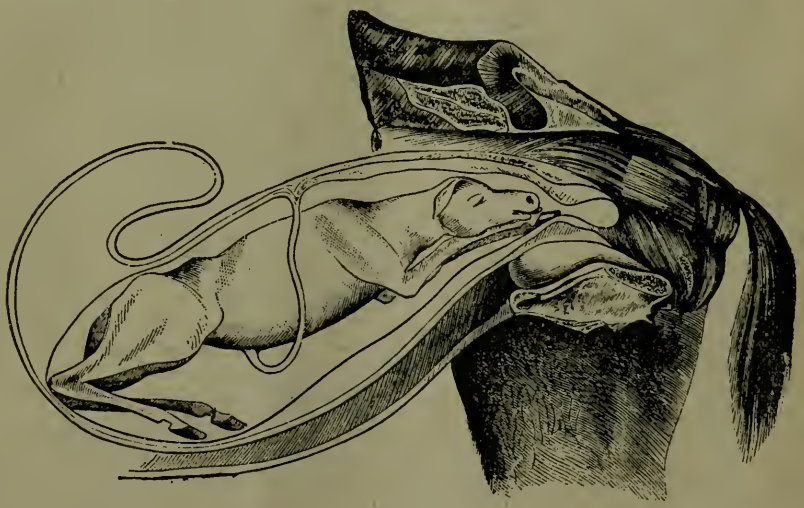

Fig. 17.

NORMAL POSITION OF THE FOETUS IN THE MARE AT THE THIRD STAGE OF PARTURITION.

and more painful and difficult for the mother, while it is often fatal to the foetus. When the "water-bag" ruptures, its contents partly escape—that behind the chest of the foetus being retained, and voided only in small quantity as the womb contracts. When the membranes are weaker and thinner than usual, they may rupture before the mouth of the womb is completely dilated, and then the fluid escapes in a small quantity at a time; this frequently happens with

the first birth, though it is sometimes observed in protracted labour, which is the most painful. Generally, no harm results from this premature rupture if parturition is not too long delayed; indeed, in some cases it may be useful, as when the womb is over-distended with fluid. In other instances the membranes may be remarkably strong, and artificial rupture may even be required. The contractions are most energetic and rapid, and every time they are made the waters flow in small quantity, moistening and re-

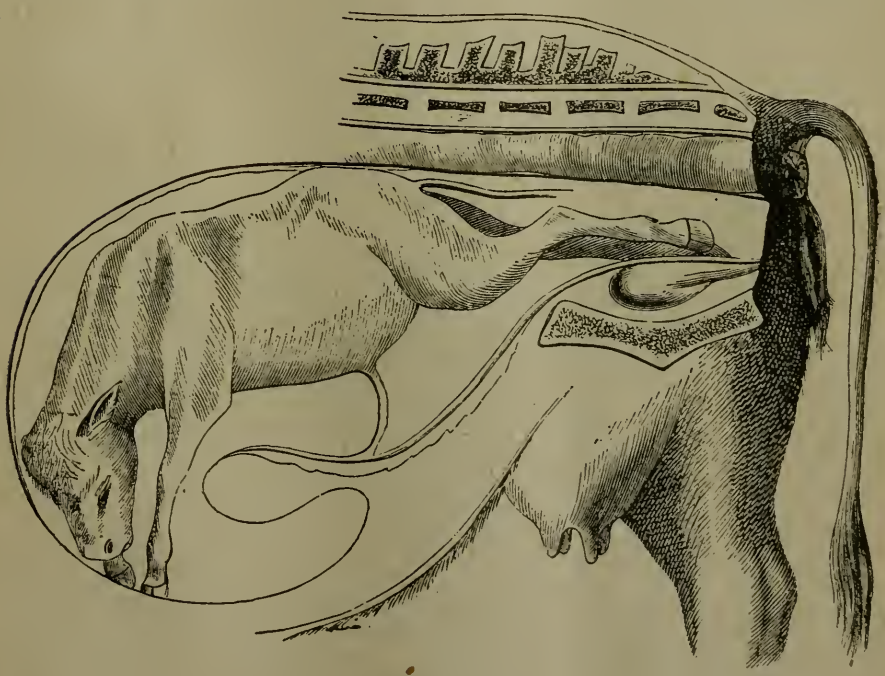

Fig. 18.

POSTERIOR POSITION OF THE FOETUS AT THE THIRD STAGE OF NORMAL PARTURITION.

laxing the parts; the foetus passes on until the fore feet and muzzle, forming a kind of cone, appear at the vulva, the orifice of which is opened by them. When the head has cleared the vulva, there is usually a short pause, as if to allow the muscles of this region to become accustomed to the distention, and to prepare them for the still greater strain,

the passing of the shoulders and chest of the foetus, which have now arrived at the inlet of the pelvis, and as they form the deepest and most difficult part of the young creature's body, the contractions for its expulsion, though most powerful and continuous, only impel it slowly towards the outlet, on arriving at which a more energetic and painful effort than all the others pushes it through. The act may now be said to have terminated; as to expel the croup requires only a few comparatively weak throes, and the weight of the anterior part of the body of the foetus, hanging beyond the vulva, greatly aids them. It is rare, indeed, that the croup offers a serious obstacle to expulsion.

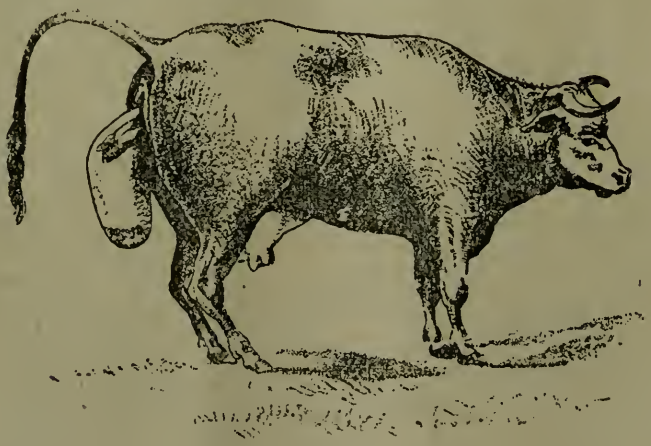

Fig. 19.

STANDING POSITION OF COW, IN THE ACT OF PARTURITION.

After the young animal is expelled, the navel cord is torn, and the waters remaining in the womb escape, accompanied or followed by a little blood, resulting from the sudden separation of the after-birth.

THE POSITION assumed by animals during parturition is somewhat variable. The larger animals which usually only bring forth one at a birth, such as the Mare, Cow, and Sheep, generally do so standing; the young creature, being sustained by the navel cord when it has cleared the

vulva, glides gently on the half-flexed hocks of the parent, and so reaches the ground without injury (Fig. 19). The standing position, however, is not constant with these animals; and frequently they bring forth in a reclining position (Fig. 20), maintained from the very commencement of the act, and only rising when birth is completed. It is rare, indeed, that these animals lie full length on one side of the body during parturition, and when it does occur it nearly always indicates a long, difficult, and exhausting labour.

Multiparous animals—as the Bitch, Cat, and Sow—always assume the recumbent position, and lie reclining on

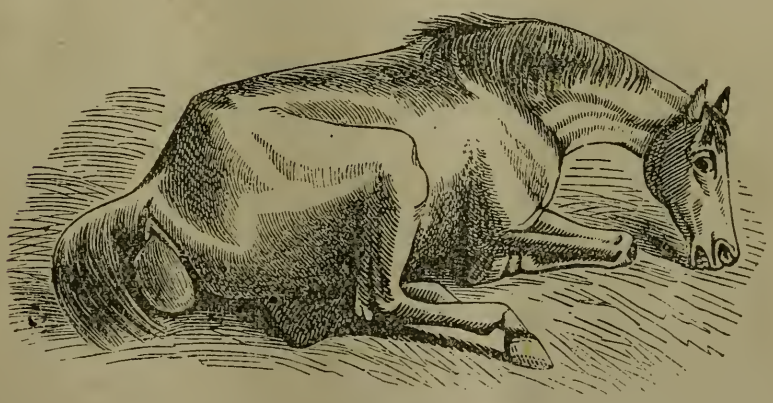

Fig. 20.

RECUMBENT POSITION OF MARE IN THE ACT OF PARTURITION.

one side, with the body disposed in a semi-circular fashion, the head towards the tail. For in this position, as each foetus issues from the vulva it is within reach of the mother's mouth; so it can remove the membranes from the foetus, divide the navel cord, clean it with its tongue, put it in a proper position, and even direct its head towards the teat, in order to soothe it while another is born. With the Sow, the young creature is expelled with such force from the vulva that it often turns a somersault. It may also be observed that, with the small multiparous animals the

"water-bag" usually only appears with the first of the litter, the other being preceded or followed by their ruptured membranes.

The total DURATION OF DELIVERY is extremely variable, not only in the different species, but even in the same animal at different births. With the Mare it is usually brief, and is generally accomplished in about ten minutes, sometimes in five minutes, though it may extend to a quarter or half hour, rarely more. This rapidity appears to be due to the fact that the afterbirth is detached from the womb during the early pains, and consequently the foetus cannot live long after this occurs—three hours being supposed to be the limit. The duration of delivery in the Cow is, on the average, one to two hours; though it may only be a few minutes to half an hour, or be extended without injury to the calf, to one or two days. With the Sheep the period is very brief, being about fifteen minutes. If there are several Lambs, there is usually an interval of fifteen minutes to two hours between them. With multiparous animals—Sow, Bitch, and Cat—there is ordinarily a period of ten or fifteen minutes, and sometimes half an hour, an hour, or even more, betwen each birth. Frequently the Sow will bring forth ten young ones within the course of an hour.

With those animals which are delivered in the standing position, the navel cord is torn when the young creature reaches the ground, and usually close to the belly. If the mother is recumbent when the offspring is born, the cord is torn as she gets up, which is usually immediately after parturition. Sometimes, however, the cord is sufficiently strong and elastic to resist spontaneous rupture, and the young creature is born with the membranes attached to it by means of this bond of union. The mother then, by a remarkable instinct, in cleansing the young creature with her tongue, gnaws through the cord and sets free her progeny.

The Mare and Cow have been known to do this at times; otherwise it is usual with the carnivora. But it sometimes happens that it is necessary for the attendant to divide the cord; this division should be made at a short distance from the navel, by scraping or cutting direct through the navel cord. Usually there is nothing to be feared from bleeding; but should this take place, for treatment see (Bleeding from the Navel).

FOURTH STAGE OF NATURAL LABOR: EXPULSION OF THE MEMBRANES.—The expulsion of the foetal membranes, or "after-birth," may occur at birth, immediately after birth, or be delayed for a variable period. Immediately after the foetus is expelled, the womb contracts and retracts energetically on itself, and its internal capacity rapidly diminishes; consequently the after-birth is ultimately separated from the wall of the womb. The same contractions which loosened it also forces it through the mouth of the womb into the vagina; and the muscles again being stimulated by its presence here, as they were by the head of the foetus, add their powerful contractions; so that these new pains, aided by the appended navel cord, soon bring the whole mass away.

With the Mare, owing to the slight adherence of the after-birth, the separation of the membranes take place rapidly; and if the Foal is not born in the intact envelops, generally only a few minutes elapse before the after-birth is detached. Retention of the after-birth is exceedingly rare in the Mare, though it is very dangerous; as in attempting to remove it there is great risk of haemorrhage. With the Cow, the adhesion between the womb and foetal membranes is very intimate. The Calf is never born in its intact envelops, and the after-birth is only slowly and tardily expelled—two, four, or more hours, or even days being required; and frequently when retention of the after-birth occurs in the Cow, it will be found necessary to remove it

artificially. Multiparous animals get rid of the membranes as they expel the foetuses, the birth of the first being followed in a very short time by its membranes; after which comes the second foetus, then its membranes, and so on; so that only those of the last foetus may be retained—an accident which sometimes occurs.

When the young creature is born in its intact envelops, the mother, if at large, frees it from them by gnawing them through; it is seldom that the progeny releases itself by its own efforts. If the mother should chance to be tied up, as in a stall, assistance may be required to cut the navel cord and extract the young animal from its imprisoning membranes, else it may suffocate. (See Attention to the Offspring When Delivery Has Taken Place.)

NECESSARY AID IN NORMAL PARTURITION, OR NATURAL LABOUR.—Although as a rule, parturition is generally effected in animals without the intervention of man, yet from the nature of this act and the unfavorable consequences which are sometimes noted, certain attentions and precautions should be observed. These attentions and precautions should be entrusted to a competent person; as it is seldom that the Veterinary Obstetrist is called in unless something serious has occurred. The mother, as well as the offspring, require watching, and more or less nursing. Therefore the owner of, or attendant on, an animal which is about to bring forth young, should be able to ascertain the position of the foetus, and decide as to whether parturition may terminate in a natural manner, or if the existing obstacles are easy to overcome. If they are not, he certainly should not venture to attempt delivering the animal himself, or to pull about the mother or foetus in those cases which will require the aid of the surgeon's knife to a great and dangerous extent; as this may only tend to aggravate the trouble, and render relief more difficult. The Veterinary Obstetrist should be sent for, as his knowledge

and practiced manipulative and surgical aid will, in the majority of cases, if his assistance is obtained in due time, bring the most complicated labour to a prompt and happy termination—preserving the mother, and often the progeny.

ATTENTION TO THE MOTHER DURING THE FIRST TWO STAGES OF NATURAL LABOUR.—When animals are about to deliver their young, they should have suitable places provided for them. As the act of delivery is performed with a certain amount of pain and uneasiness, the Cow and Mare should be left untied, and provided with a large, comfortable box stall, containing a sufficient amount of bedding to prevent slipping and injuries; or if in proper season, they will do better if placed alone in a pasture field. The Sow should have a separate sty, and even the Sheep may need a separate allotment. If animals are kept in stables, the temperature should be comfortable and the ventilation good.

When normal parturition commences, it is rare, indeed, that anything requires to be done during the first two stages of labor. Therefore the animal should be allowed perfect quietude; and if the light in the stable is too bright, it may be partially excluded. A trustworthy person should remain with the animal, in order to avert accidents; but he should keep himself out of sight, and meddle with the animal as little as possible. In the case of the Mare it has been recommended to empty the rectum either with the oiled hand or by means of raw linseed oil injections, if the dung is hard, in order to avert rupture of the intestines or bowels. The labour-pains should be normal, and the act should neither be hurried nor abrupt, nor yet too slow; and the mother should not exhibit any constitutional weakness or physical debility. During the second or third stage of labour an examination should be made (to make successful examinations, see Sensible Signs of Pregnancy, and How to Make Successful Examinations in Difficult Parturition), to

see if the little animal is started right—that is with the two front feet first, the head resting upon and between the legs, the upper part of the head and backbone resting against the mother's backbone (Fig. 17); or if the hind feet start first (Fig. 18), it will be delivered in that position; but see that its backbone rests against the mother's backbone. If the act of parturition is not sufficiently advanced, and the soft parts through which the foetus has to pass are not enough dilated, time ought to be allowed for this to take place, unless something irregular or abnormal occurs. As a rule, there should be no hurry to interfere with the progress of the case, as a somewhat long period is often required for preparation; and if this is accelerated, accidents are more likely to occur than if the labour had been long and protracted. Therefore, if the foetus lies in either of the aforesaid positions, do not meddle too much, but allow some time to elapse before aid is rendered, except it be a Mare, then do not delay too long, for if the Colt is not delivered voluntarily within an hour from the time of commencement of the first expulsive efforts, aid should be rendered immediately or the little animal may be lost.

The irregularities during the first and second stage of Natural Labour, are few in number; the principal being Hurried (Tumultuous) Labour, and Protracted Labour.

HURRIED (TUMULTUOUS) LABOUR DURING FIRST AND SECOND STAGE OF NORMAL PARTURITION.—In this kind of labour the act of parturition is irregular and precipitate; and though the pains are excessive and frequent, yet no progress appears to be made, the parts not being prepared, while the neck of the womb is often in a state of spasmodic contraction, rigid, and painful. This condition is most frequently observed in young, well-fed, vigorous, irritable animals, and especially when bringing forth the first offspring, they become excited and trou-

bled at the first pains, and give themselves up to violent expulsive efforts that hinder the natural course of parturition. Usually in such cases, the mouth of the womb has not dilated sufficiently to allow the foetus to start, or the other surrounding tissues have not sufficiently relaxed.

TREATMENT OF HURRIED, OR TUMULTUOUS LABOUR.—In the majority of cases, amendment is ensured by diverting the animal's attention, walking it about for a short time, whisking the belly gently, and keeping it in a quiet, dark place. If, however, the pains are violent, and the agitation great and persistent, give to the Mare and Cow half ounce doses of chloral hydrate and repeat the dose in half an hour if necessary. The chloral hydrate may be given in draught, or as rectal injection—the injection is generally preferable. Blankets wrung from hot water should be applied to the loins and belly. Frequently good results are produced by injecting tepid water into the vagina. If the mouth and neck of the womb are in a state of contraction, by placing a little extract of belladonna—about one drachm—on these parts will cause them to open rapidly. With small animals, a few drops of laudanum, either in draught or rectal injection, is usually sufficient. Quiet, soothing, and simple treatment will generally bring about a normal state of affairs; the agitation and irregular straining subside, and easy delivery will occur in six, twelve, or twenty-four hours.

PROTRACTED LABOUR DURING THE FIRST TWO STAGES OF NORMAL PARTURITION.—This is due solely to the inability of the womb to expel its contents. This most frequently occurs when the membranes have ruptured, the waters have entirely escaped, and the womb is in a state of general contraction, making no effort to expel the foetus. This usually happens when the foetus is dead. Protracted Labour may also be due to constitutional weakness. It is observed in emaciated, puny, and

frequently old animals, which are debilitated from lack of sufficient good food, prolonged secretion of milk, overwork, or worn by chronic wasting diseases.

SYMPTOMS.—In the Mare and Cow the breathing is comparatively shallow and repeated; feeble and unfrequent straining, weak pulse, restlessness and indications of suffering, extremely slow progress in birth—parturition in the Cow being extended to twenty-four, and even forty-eight hours, though the foetus may be in a good position, of ordinary size, and the passage clear. If the hand is introduced into the vagina, it will be discovered that the contractions of the womb are weak. There is no urgent danger to the mother in this condition; though the life of the foetus is often imperilled.

TREATMENT.—An examination is necessary, in order to ascertain whether there is any obstacle to parturition. Should such not be found, then the mouth of the womb should be gently and carefully dilated with the fingers, until it is wide enough for the hand to pass into the womb. Moderate and judicious drawing on the parts of the foetus which present, when the mother makes expulsive efforts, will bring the foetus into the pelvic cavity and through the vulva.

DEATH OF THE FOETUS.—When parturition is retarded it is often a question whether the foetus is dead or alive, and to answer it correctly is sometimes difficult. Foul odor from the waters which escape has been held to prove the death of the foetus; although it is a good sign, yet it is not infallible. On introducing the hand into the womb, if decomposition is well advanced, the hair can easily be removed from the foetus; then there can be no doubt as to its being dead. Should the presentation be that of the head, then passing the fingers into its mouth and titilating the tongue of the foetus will prove a test of its vitality, as the jaws and tongue are almost certain to move if it lives; though the absence of movement will not be decisive. If the

navel cord can be reached and seized between the thumb and index finger, slight compression will discover whether or not the arteries pulsate. The absence of pulsation affords a strong, but not in every case a sure, presumption that the foetus is dead. For other indications, as well as proper examinations (see Sensible Signs of Pregnancy; also, How to Make Successful Examinations in Difficult Parturition).

CAUSES OF DEATH OF FOETUS.—They are not numerous, and may be enumerated as follows: 1. KNOTS on the navel cord; 2. TWISTS of the cord around the body, neck, or limbs of the foetus, which may be sufficiently tight to interrupt the circulation in the navel vessels; 3. PROLONGED COMPRESSION OF THE NAVEL CORD, due to the foetus remaining a long time in the passage of the womb and vagina, whereby the circulation of blood is checked; 4. PREMATURE RUPTURE OF THE MEMBRANES and escape of the whole of "the waters," which, if parturition is not soon completed, exposes the foetus to great danger from immediate pressure of the womb upon it; 5. DISUNION, more or less complete and extensive, between the womb and the foetal membranes, through which the foetus receives its nourishment and supply of air; when this vital connection between the mother and foetus is interrupted, if the foetus is not quickly expelled it must die from suffocation. Owing to the difference in the afterbirth of the various animals, this foetal suffocation is not equally common in all. Many veterinarians, and among them Saint-Cyr, have been struck by the fact, that no matter how soon they were called into a case of difficult parturition in the Mare, nor how trifling the difficulty might be, and rapid the delivery, the living foal was never produced; while in cases in Cows, though parturition was decidedly more difficult, and requiring manipulation for more than an hour, living calves were the rule. So common is this experience, that a very distinguished French veterinary obstet-

rist—Donnarieix—has laid it down as a maxim that the Foal does not live more than three hours, often less, in the womb after the first expulsive efforts or straining; while the Calf in the same condition can live much longer, sometimes for several days, after the first expulsive efforts of labour. The foetus may also perish when force is used in its delivery.

ATTENTION TO THE MOTHER DURING THE THIRD STAGE OF NATURAL LABOUR.—This is the expulsive stage, and during this period there are two important matters to be observed: 1. Rupture of the water-bag; 2. When to use traction on the foetus.

1. RUPTURE OF THE WATER-BAG.—This should not be artificially ruptured too early; and in the Cow it should never, as a rule, be opened artificially, as it is always spontaneously ruptured at the proper time, and not infrequently sooner than it should be. With the Mare, however, matters are different. In this animal the foetal membranes are thick, firm, and feebly adherent to the womb; so that the Foal is sometimes born completely enveloped in them. Therefore, in the Mare it is well to rupture the water-bag when it appears as a large tumor beyond the vulva; until this happens nothing should be done, unless the mouth of the womb is completely dilated, and the head and feet of the foetus are well in it. The membranes may be torn by the fingers, or cut by scissors or knife, care being taken not to injure the Foal. As has been said, when the water-bag is ruptured too early, the womb contracts on the foetus; this is opposed to birth. Besides, the genital passage becomes dry and adherent, and this is an additional obstacle, which can only be remedied by injecting into the vagina flaxseed tea, milk, glycerine and water, oil, or even simple tepid water.

2. TRACTION OF, OR DRAWING, ON THE FOETUS.—When the water-bag is once ruptured, the natural expulsion of the foetus should be waited for. In

some instances, however, this expulsion may be conveniently assisted by judicious drawing on the foetus. (See Traction.)

If the foetus presents the fore feet and head (Fig. 17), as soon as these parts have cleared the womb, take hold of the pastern of each fore leg and draw steadily during each labour pain of the mother. This traction or drawing should be towards the hocks of the mother, so as to allow the body of the foetus to follow the curve of the pelvis; drawing a little to the right and left, will also aid in passing the shoulders and afterwards the haunches. When the head and neck are clear of the vulva, they should be supported.

If the foetus presents posteriorly, that is, when the hind feet come first (Fig. 18). This position will be recognized by the pasterns bending upwards instead of downwards, also by the feel of the hocks, which is vastly different from the knee. In this position, the two limbs are to be seized at the pastern, and drawing exercised at first slightly upwards, in order to carry the stifles over the brim of the pelvis, which sometimes checks them; then downwards, to bring the croup below the sacrum; and lastly, an alternate movement from right to left and left to right, to free the haunces, one after the other. Immediately after delivery, seize the young animal by the hind legs and raise it clear from the ground, with the head hanging downwards, so that any fluids remaining in the nostrils and wind pipe, will escape. Many Foals and Calves are lost annually, through neglect to empty the fluids from the windpipe; the lungs are too weak to force air in through these fluids. When the foetus is born head first, these fluids escape, as the head hangs down during delivery. It is well to see that the tail of the foetus is in the right direction before traction has been practiced to any great extent.

TRACTION OF THE FOETUSES IN TWIN PREGNANCY.—Usually twin pregnancy is not recognized until birth takes place. The escape of only a small quantity of "the waters," and the small size of the creature first delivered, when compared with the size of the mother's abdomen, are indications that more young will be produced. In case there is another foetus, soon another water-bag appears, and another foetus presents at the vulva. Frequently when the position of the two foetuses is natural, they are brought forth one after the other successsively, and without any assistance being required. This is the case more particularly with the Sheep and Goat. But sometimes, and especially with the Mare and Cow, the two foetuses present themselves simultaneously at the pelvic inlet, and neither can pass through. In such a case it is necessary to push back the one least favorably presenting, and to keep it away until the fore limbs of the other are in the passage. If the two foetuses chance to be in an unfavorable position, the fore legs of one should be sought for (recognized by the knees, and to a certain extent by the pasterns), or the hind limbs (recognized by the pasterns and hocks), if they are convenient for the purpose, then traction or drawing should be exercised, as in the case of a single foetus, and according to the directions given above, taking care to keep the other foetus out of the way. Should it not be possible to extract this foetus, it may be that certain parts of the other stop its progress, or that the expulsive forces are expended on the other foetus, although it is farthest from the mouth of the womb. It is then necessary to push back and turn the former foetus, and endeavor to extract it by the extremity opposite to that which was first tried. But if the fore limbs and head have been got into the passage, the position need not be changed, the procedure then being the same as for a foetus disproportionately large.

CAUTION TO THE OPERATOR.—In exploring or examining the genital canals of the female, gentleness and tact should be scrupulously observed, and the hand and arm ought to be well oiled with sweet oil or clean lard; the nails of the fingers being cut at least moderately short. Also read examinations under Sensible Signs of Pregnancy, and How to Make Successful Examinations in Difficult Parturition. The time chosen for exploration should be the interval between the labour pains, and care must be taken not to rupture the water-bag, if it has not been previously ruptured. The examination may be made while the animal is standing or lying, though the standing position is generally preferable.

It must not be forgotten that, when traction or drawing is required, this should be slow and moderate, and only applied when the animal itself makes expulsive efforts. Violent and sudden drawing is to be avoided, as it may inflict serious injury, while doing little, if anything, in aiding delivery; and even should this be effected, the contractile powers of the womb will be deranged, when the contents of that organ are suddenly and forcibly removed. The simplest and safest traction is that made by the hands of the operator—for both hands may, in some cases, be introduced into the vagina. Should he not have sufficient strength or purchase, an assitant may clasp him around the chest and pull at and with him—gradually and steadily during the labour pains.

ATTENTION TO THE OFF-SPRING IMMEDIATELY AFTER NATURAL DELIVERY HAS TAKEN PLACE.—No special rules can be laid down for the management of new-born animals, as this may vary more or less, according to the species. However, there are some general rules which may be well to observe.

With regard to the Foal or other creature which may be born in the foetal membranes, it is evident that it must

be freed from them immediately, or it will perish from suffocation. If the navel cord is not torn, it may be double-tied about two inches from the navel, and then divided between the tied places, either with a clean knife or scissors. Care must be exercised in not bruising or injuring the navel, or allowing this part to become irritated either by the litter, manure, or urine, as serious complications, such as inflammation of the navel and cord may result. (See Inflammation of the Navel Cord.)

Immediately after delivery, remove the mucus, which sometimes clogs the mouth and nostrils of the new-born (this process is explained under Suffocation, Asphyxia of the New-Born, which see), and hinders its respiration or breathing. As soon as this has been accomplished, the young animal should be examined to ascertain whether it be strong or weak, whether all the natural apertures exist—such as the eyes, mouth, anus, vulva, uretha—and if any of them chance to be absent, to make artificial ones soon, if possible, by a kind of puncture, enlarging afterwards by the knife and sound, and preventing union by pledgets of lint, etc.

SUSPENDED ANIMATION, SUSPENDED LIFE OF THE NEW-BORN. — Whenever the connection with the mother is interrupted, the young creature must breathe, and respiration must now be carried on by the lungs, through the nostrils. The establishment of this is purely a reflex act. The foetus hitherto maintained at a certain and always uniform degree of warmth in its liquid bed in the womb, is suddenly ushered into the cold and dry air of the outer world; and this transition operates chiefly on the skin, proucing a peculiar impression—such as we ourselves experience in being suddenly immersed in cold water; this impression is at once transmitted to the brain and spinal center, whence the reflex influence of the spinal cord is called into play, and the re-

spiratory muscles are excited to movement by the nerves. All these muscles contract simultaneously, the chest is dilated, and the air rushes into the air-passages and lungs, distending the air-cells in the lungs, and instituting the process of respiration. This reflex act may also be produced by pressure on the navel cord. It sometimes happens that the young creature is in a state of unconsciousness when born, or very soon after, and gives no sign of life. Sometimes this unconscious state is from weakness, in which the animal is cold and does not breathe, the mucous membranes being pale and the body flaccid; or if it is the result of an over-abundance of blood, then the mucous membranes are of a livid blue tint, the lips and tongue swollen, and the eyes red.

TREATMENT.—If the young animal is in a state of unconsciousness when born, attempts should be made to revive it by pouring cold water on the head, beating the body with a cloth dipped in cold water—particularly should this beating be exercised about the face and chest. Dry rubbing the limbs, tickling the nostrils with a feather, puffing tobacco-smoke into the nostrils, imitating the respiratory movements, and inflating the lungs by means of a pair of bellows, acting through the nostrils. So long as the heart pulsates there is a probability of restoration to life.

If unconsciousness is the result of an over-abundance of blood, allowing a little blood, from eight to fourteen ounces from the Foal or Calf, to flow from the navel cord, and even cutting this or fomenting it with hot water to induce bleeding, is very useful, in conjunction with cold water to the head and cold water injections into the rectum. But as a rule, death is always imminent in these cases.

GENERAL CARE OF THE YOUNG AFTER DELIVERY HAS TAKEN PLACE.—With the larger animals, the newly-born creature should be placed before the mother, if it is not near her; and it generally follows that

she instinctively licks off the viscid matter which covers its skin; and in doing this the circulation of the skin is excited, and, by sympathy, the other organs of the young animal. Consequently, it becomes revived, soon endeavors to get up, and though it may fall a few times, yet it generally quickly succeeds in maintaining itself on its limbs, and instinctively seeks the maternal teat. There are exceptional cases, where the mother does not attempt to cleanse her young; this is most frequently observed when bringing forth the first progeny, and when the labour has been long and painful. But it will generally be found that sprinkling the young animal with a little flour, bran, or salt will excite the attention of the mother and induce the cleaning process. Should it not do so, then the creature must be well dried and rubbed with a sponge, hay-wisp, or a cloth, and kept warm. Some mothers become quite savage after parturition, and will not allow their progeny to come near them, and will even kill their young; though this most frequently happens when they are tormented by spectators. When this occurs, it is well to leave the mother and her young quietly together for some time.

As the Foal, Calf, and Lamb alwas suckle in a standing posture, if they are weak and cannot reach the teat within half an hour or so after birth, it will be found necessary to give some assistance in bringing them to their mother, and applying the teat to the mouth of the young animal, at the same time caressing and soothing the parent if disinclined to its young either by temper or by painfulness of the udder. This coaxing and handling should be performed by some one accustomed to the animal.

Sometimes from weakness or inexperience of the Foal, and temper of the Mare, the Foal runs the risk of perishing from starvation. In such cases the Mare should be safely secured, and two persons ought then to push and support the young animal behind by joining a hand of each, while the

other hands are employed in directing it towards the teat, which it should be allowed to use for two or three minutes. After one or two attempts of this kind, the Foal begins to find its way to the udder by itself, while the Mare becomes more reconciled to it. In assisting the youngster to nurse, do not place the hand under the breast bone; as it is quite soft and yielding, you may do considerable harm, even causing quite a lively Colt to become sick and die. Many Colts are lost in this way, the owner considering that he was doing an act of kindness. When it is necessary to hold them up to nurse, catch one arm around the forelegs and breast, and the other arm around its haunches, and you will not injure the Colt in the least. When the Foal exhibits great debility, it may be preferable to feed it for a day or two with the milk of the Mare, which has been drawn by hand.

With the Cow, these difficulties are seldom present, and if an animal will not take to its Calf, the Calf is generally transferred to another Cow, or it is artificially reared. The Foal may even be reared in this manner, though not so easily as the Calf. The milk of the Cow or Goat will suffice, and there is generally little difficulty in teaching it to drink it, by at first pouring a little into the mouth, while the finger is inserted therein; or a piece of cloth steeped in milk, or even a bottle and tube may be used. Calves intended for slaughter may be artificially fed, and especially if nutritive substances are added to the milk; but for those intended to be reared, it is a mistake to separate them from the Cow during the early days of their existence.

Lambs, when able to stand, and if they do not readily find their way to the teat, should have a little milk from it pressed into their mouth. With twin Lambs, if the Ewe is in good condition, the udder well filled, and the weather and pasture favorable, both may be suckled; in the opposite conditions it may be necessary to remove one. If the Ewe

does not yield sufficient milk, this may be largely remedied by giving a liberal supply of good food.

The Bitch, Sow,and Cat, usually lie when suckling their young; so that there is seldom any difficulty with them; the only care generally required in the case of young Pigs, is to prevent their being crushed by the Sow in the act of lying down or moving. If the litter is large plenty of good food is necessary. It is also quite necessary that he Sow should be supplied with a pail full of good, warm, nourishing slop as soon as she has delivered her young, as this will appease her ravenous appetite, and will restrain her from devouring her young. Sows usually eat their progeny to satisfy the uncontrollable hunger, which they experience during and immediately after parturition. If the Sow has more young in the litter than teats, unless watched the weakest Pigs will die of starvation. Each young pig has its own particular teat, to which it is persistently attached; and if one of the little Pigs becomes sick and unable to suck, the teat it has been nursing will soon cease secreting milk. In general a Sow should not be allowed to rear more than ten in a litter. Cleanliness and warmth are required for young Pigs.

Puppies and Kittens do not require any special care beyond a warm, clean, and dry abode.

With all newly-born animals, after the first milk has been taken, there is usually an abundant evacuation of black resinous matter (meconium) from the bowels of the young animal, caused by the "colostrum," as the first milk is usually called; and it is well to notice if this evacuation occurs, as when it does not, serious constipation may ensue. In such cases, a mild laxative—such as castor oil—should be administered to obviate this condition. (See Constipation.)

Gentle exercise is as necessary for the Foal and Calf, a few days after birth, as it is for their parents. Therefore, a meadow is preferable to a stable for rearing the young.

It is not rare to find newly-born animals, particularly

when parturition has been laborious, injured more or less, from the manipulation of the obstetrist during birth. The most frequent injuries are those due to the use of instruments and appliances. The injuries may be dressed with cold water, to which has been added a very little alcohol, or with arnica. Abrasions which are only superficial, may be treated with the following solution: Water, four ounces; glycerine, one ounce; carbolic acid, twenty drops. Sprains should be treated by friction with soap liniment. (See formula for making Soap Liniment under Dropsical Swellings of the Legs.) Wounds and lacerations, if very severe, must have appropriate surgical treatment. Other accidents and diseases which young animals are subject to, will be alluded to and classified in another part of this book, which has been set apart for the Diseases and Abnormalities of the Young Animal.

ATTENTION TO THE MOTHER AFTER NORMAL LABOUR.—When labour has been natural, and the animal is vigorous and not much fatigued, simple hygienic measures are all that is necessary. The animal should be kept comfortable, with plenty of pure air, but away from draughts. If it has been perspiring, the body, and particularly the belly, should be well wisped if it is a large animal: indeed, this friction is always to be recommended, as it often allays the restlessness which sometimes persists after delivery; it also regulates the circulation, and appears to hasten the retraction of the womb. It may be necessary to cover the body with a blanket, as the animal is very susceptible to cold at this period. A gallon or so of nourishing, tepid gruel, or even soup, may be given; after which the diet should be moderate and easily digested. Clean, dry litter should be plentifully supplied, and the animal left alone for half an hour or so, after which it may be visited and offered more gruel. From five to eight, or even fifteen days' rest should be allowed, according to circumstances.

When parturition has been protracted, and the animal has suffered much, and especially if the generative organs have been bruised and lacerated, nursing should be continued longer, and greater precautions adopted. In these cases every care should be taken to prevent inflammation of the womb; and with this object in view, wash out the vagina by injections of a tepid, three per cent. solution of permanganate of potassium; apply warm cloths to the loins, allow light diet, with small doses of sulphate of magnesia, and keep clean in a good stable, and in a pure atmosphere.

DOSE OF EPSOM SALT (SULPHATE OF MAGNESIA).—Mare, two ounces; Cow, three ounces; Sheep and Pig, four drachms; Bitch and Cat, one drachm. Mix with water and give as a drench. Repeat the dose nights and mornings unless the movements of the bowels should become too active, at which time discontinue. With the Bitch and Cat, epsom salt sometimes produces vomiting. Therefore, half ounce doses of castor oil is preferable for these animals.

Sometimes the debility is so extreme that the animal scarcely gives any indication of life. There is then all the more need for careful nursing and quietude. Friction to the surface of the body, clothing, and a good bed are particularly necessary; and as the secretion of milk is usually difficult in these cases, this must be attended to (see Absence of Milk). It must be borne in mind that cold and damp are dangerous immediately, and even for some time after, parturition. Therefore, when turned out to pasture care should be taken to afford protection in bad weather, and damp, cold localities should be avoided. With regard to Ewes and Goats, if the weather is mild and the situation favorable, protection is not required; but if cold winds and wet prevail, then shelter is necessary. When more than one Lamb is likely to be produced, the first should be kept warm and receive a little Cow's milk diluted with water, until the Ewe has finished Lambing. The Sow generally

suffers from weakness and prostration after parturition, and requires plenty of nourishing and easily digested food. When this is given there is less likelihood of the animal devouring its young, and all the more so if not irritated by the presence of people.

DISORDERS OF THE MOTHER AFTER DELIVERY.

Under this subject will be included After-pains, Lochia, Milk-fever. Secreting of Milk (Lactation), and Contraction of the Womb.

1. AFTER-PAINS.—These are the painful sensations in the abdomen, which persist after the expulsion of the foetus. They are due to the contractions of the womb, that go on for some time, and eventually reduce the womb to its ordinary size. After an easy labour, there are generally fewer or no symptoms of these pains; and when they are present the only indications are whisking of the tail, at which time the walls of the abdomen appear to be harder. They seldom continue longer than twelve or twenty-four hours in these cases, and do not require special treatment.

In other cases, and particularly when birth has been very sudden and rapid, they persist longer and are more severe. The animal paws and exhibits suffering; it also stretches as if trying to urinate, arches the back, contracts the abdominal muscles, and strains. When these pains are continued beyond twenty-four hours, we may apprehend the retention of a portion of the foetal membranes (for treatment see Contraction of the Womb; also, Retention of the Foetal Envelops). Or it may be due to commencing Inversion of the Womb (which see). It will be necessary to make an examination in order to discover the cause.

2. LOCHIA.—The term LOCHIA has been given to the bloody-streaked, purulent mucus, and, finally, mucus evacuations from the vagina occurring after delivery, and generally persisting until the womb has regained its natural size and condition. This discharge accumulates in the

womb, and usually only escapes when the animal undergoes exertion, and during urination, and voiding the dung. It sometimes accumulates about the thighs and tail, as well as on the litter; and when the animal has been lying, it forms small pools on the ground. This discharge does not have a bad odor, unless the womb or vagina is the seat of some pathological process, or a portion of the after-birth is retained. The average duration of this discharge is from five days to two weeks; and should this discharge cease before the proper time, it will produce dullness, indifference of the mother to its progeny and surroundings, poor appetite, suppression of milk, slight fever, with dry erect coat, and constipation.

TO PREVENT THE UNTIMELY CESSATION OF THE LOCHIA.—Before and after parturition the food should be sound and nutritive, but moderate in quantity, and such as will not predispose to an over-abundance of blood; not to travel or fatigue the animals towards the end of pregnancy; to shelter them at this period; not to hurry labour, and only to render assistance when necessary; and after the delivery to attend to the removal of the after-births which are sometimes retained in the Cow for an abnormal period, but should not be allowed to remain longer than four or five days. For the removal of the after-birth (see Retention of the Foetal Envelops).

3. MILK-FEVER.—(See Milk-fever or Parturient Apoplexy.)

4. LACTATION.—Before parturition, preparation for the secretion of milk is already being made in the glands of the udders, and immediately preceding that event a thin serous, or milky fluid can often be expressed from the teat. The first milk or "colostrum," secreted after delivery is a viscid, dirty-white, or yellowish fluid, sweet, though unpleasant to the taste, and of a greater density than that of ordinary milk. It is this first milk or "colostrum" which

acts as a laxative, and is so necessary to the new-born animal. Towards the fifth or sixth day, or even longer, after parturition in the Mare and Cow, earlier with some of the other animals, the colostrum disappears, and then we have the ordinary milk.

In some instances, the secretion of milk may become a source of annoyance, or even of danger, when it is too abundant or is not withdrawn when secreted. This happens more particular when the animal is deprived of its young by death, or for special reason. For other causes, symptoms and treatment (see Inflammation of the Udder—Mammitis).

5. CONTRACTION OF THE WOMB AFTER NORMAL PARTURITION.—After gestation and parturition have been completed, it is necessary that the genital organs should return to their natural size and condition, which is generally the case after labour, when everything occurs regularly. But it sometimes happens that the muscular layer of the womb appears to be struck with paralysis soon, or even immediately after delivery; so that it remains distended, and its cavity is so large that the arm can easily be introduced into it. When this condition exists, the mouth of the womb being always more or less open, the air obtains admission, putrefaction or decay commences, and grave results may follow. An examination will discover a variable quantity of bloody, or more or less foul-smelling, matter in the cavity of the womb; and until this is removed, and the organ made to contract on itself, danger may be apprehended. The treatment should be the same as that in the Retention of the Foetal Envelops (which see).

DIFFICULT LABOR—BIRTH—PARTURITION.
(Dystokia.)

HOW TO MAKE SUCCESSFUL EXAMINATIONS IN DIFFICULT PARTURITION FOR THE DIFFERENT PRESENTATIONS OF THE FOETUS AND OTHER RESISTANCE WHICH MAY BE PRESENT.

The mode of procedure to be adopted in internal examinations and explorations have already been described, to a certain extent, under Sensible Signs of Pregnancy, and (Caution to the Operator) under Traction or Drawing of the Foetus, which should be referred to, and carefully read before the reading of this article. It is, because of the importance of these examinations that we again notice them, and will endeavor to explain the most useful points.

If possible the Mare and Cow should be examined in the standing position, as this is the best. If, however, the animal is lying, and from exhaustion or paralysis it cannot get up, then, of course, the examination must be made in the recumbent position.

When standing, the animal should be approached gently and coaxingly, and rigorous restraint is seldom necessary. With the Mare it generally suffices to have one of the fore-feet held up by an assistant, while the examination is made; if young and dangerous, it may be necessary to employ a side-line on a hind pastern, or hobbles on both hind pasterns, and perhaps a twitch on the nose. With the Cow, a strong man holding the animal's head is sufficient to make it stand quiet. When the animal is in the standing position, the operator must be on his guard against the animal suddenly dropping, which would expose him to serious injury. When the floor inclines from the tail towards the head of the animal it is most favorable for an examination, thereby throwing the intestines forward, so that they do not press on the womb.

When the examination is made in the lying position, it is much more fatiguing and difficult. In this position it is still more necessary that the croup should be higher than the fore part of the body. Also the spine should be higher than the limbs; and the more an animal is raised above the ground when it is lying, the easier is the manipulation. The Sheep, Sow, and Goat may be raised on several bundles of straw; the Bitch and Cat on a table covered with straw or cloth.

The shirt-sleeve must be rolled as high as the shoulder; although it is preferable to remove the shirt, and wear only a vest during the examination. The hands and arms should be well smeared with clean oil or grease, to render their introduction into the genital passage more easy, and less irritating to the lining membranes, also to some extent to protect the operator against infection. Rings should not be worn on the fingers. Before commencing the examination, empty the rectum, and, if possible, the bladder.

Now the fingers should be gathered together in a cone-like form, the hand—which should not be cold—is inserted carefully and steadily into the vagina at a moment when the animal is not straining—the outer margin (little finger) being downwards, thumb upwards, and pushed gently inwards by a slight rotatory movement; but the advance of the hand must be momentarily checked if the straining is at all severe, or until the animal, if irritable, has become reconciled to it. When once through the vulva, more room is found in the vagina, and the hand and arm can then penetrate with ease as far as the neck of the womb. The operator has first to satisfy himself whether the vagina is empty, or if it already contains some portion of the foetus or its membranes, and what these are; and if any tumors exist, either within or external to the canal, and if possible their nature. If soft and fluctuating, carefully push to one side and away from the passage of the foetus. He has also to satisfy himself that the pelvis has the proper dimensions.

With this object in view, he closes his hand to try if he can move his shut fist about in every direction, and with ease. Then stretching out the thumb, he can approximately judge the distance which intervenes between opposite points of the pelvic circumference, and in this way ascertain if a moderate sized foetus could pass through. The following figure and table of measurements will be found convenient:

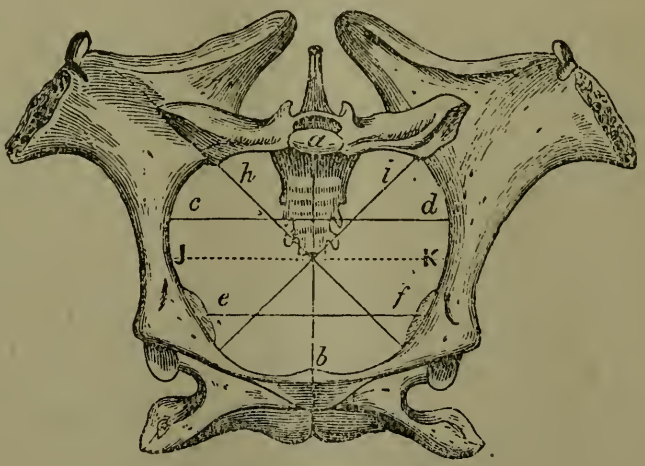

Fig. 21.

DIAMETERS OF THE PELVIS.

a b, Superior-inferior Diameter; c d, Superior Diameter; e f. Inferior Diameter; e i, f h, Oblique Diameters; J. K. Middle Diameter.

NATURAL MEASUREMENTS OF THE PELVIS.

SPECIES	DIAMETERS	MEASURES	DIAMETERS	MEASURES
Mare	Supero-inferior	8 to 9 inches	Transverse	7½ to 9 inches
Ass	" "	8 inches	"	4½ inches
Cow	" "	8¾ inches	"	7 inches
Sheep	" "	4¾ inches	"	3 inches
Goat	" "	4¾ inches	"	3½ inches
Pig	" "	4 inches	"	3$\frac{2}{10}$ inches
Bitch	" "	2 to 2⅓ inches	"	1$\frac{2}{10}$ to 2 inches
Cat	" "	2⅓ inches	"	1$\frac{2}{10}$ inches

The above measurements are for medium sized animals, with the exception of the Mare and Bitch, which are given for the large and small sized animals. After noting

the above measurements, it can readily be understood that the head of the calf, which measures from 7 to 10 in. by 4 to 5 in., cannot pass through the pelvis of a Cow which measures four or five inches, and in such cases force should not be attempted, as the foetus cannot be brought through, and must be delivered in pieces. (See Embryotomy.)

The soft parts will also engage his attention, and he must learn whether the canal of the vagina is dry, or if it livery; if it is found to be dry it should at once have oil or contains sufficient mucus to facilitate manipulation or deflaxseed tea introduced into it. Now the fingers are again brought together, and their extremity pushed as far as the neck of the womb; here the chief points to be noted are: Whether the neck of the womb still projects into the vagina, or if it is completely effaced: whether the womb has descended on the floor of the abdomen, or is yet in its ordinary position; whether the texture of the neck of the womb is soft, or if hard and in a state of spasm. (For treatment see, Hurried, Tumultuous Labour in Normal Parturition.) Whether the mouth of the womb is open or closed; if closed, or not sufficiently open to admit of the hand, it must be carefully and gently dilated with the fingers until the hand can be passed into the cavity of the womb. Here the operator will meet with the "water-bag," if it is not already ruptured, and the foetus, if he has not already encountered it: at the same time the energy and frequency of the labour pains can be ascertained. (For indications and treatment see, Hurried—Tumultuous Labour, and Protracted Labour in Normal Parturition.) If the "water-bag" is ruptured, the hand must be passed into it in order to discover the situation of the foetus—the kind of presentation and position (see Difficult Labour from Malpresentations of the Foetus), the manner in which the limbs are disposed, and any complication which may be present. If the "water-bag" is not ruptured, the hand may be passed between it and the womb, the palm being towards the foe-

tus, if it is necessary to explore deeply. When labour is advanced, the pains being well marked, the mouth of the womb dilated, and the water-bag in the vagina, it is usually preferable to rupture the water-bag; which is readily accomplished by seizing a portion of it between the thumb and first finger, and pressing the nail of the finger against the thumb. Sometimes the fingers alone are not sufficient, as when the envelops contain but little fluid; then a pair of scissors, a small trocar, or even an ordinary pen, will effect this object.

In examining for presentation and position, each region of the body of the foetus should be familiar to the touch, as it can be distinguished by its own proper characters. If the presentation and position is natural, the hand of the operator will first come in contact with either the fore or hind limbs. To distinguish the fore from the hind limbs, the shape of the joints and their mode of flexion must be taken into account—the fetlock and knee of the fore limbs bend in the same direction, while in the hind limbs the fetlock and hock flex in opposite directions; the knee, in addition, is large, round, and rather flattened in front, while the hock is flattened on each side, and offers the calcis as an unmistakable guide. There is also a difference in the shape of the feet. (See Normal Parturition, also Figs. 17 and 18.) In difficult parturition the foetus may present in a variety of positions, in which hind and fore limbs may offer first, either alone or together (see Figs. under Difficult Parturition from Malpresentations of the Foetus); if the presentation is anterior, the head will be met with, and this is distinguished by the presence of the mouth, eyes, and ears; if it is a posterior presentation, then we have the rounded croup, tail, hocks, and external genital organs. In other presentations, the neck is recognized by the mane, if it be a Foal, or by its shape, whether Foal or Calf; the shoulders by the acromion processes and withers; the chest by the ribs; and so on. In addition to all

this, the operator should judge as to the volume of the foetus ,and its proportions.

It cannot be too strongly impressed upon the mind of the reader, the necessity of a thorough knowledge of Normal Parturition, before entering into the subject of Difficult Parturition. And of the necessity of the examination being so complete as to furnish all the requirements of a sound decision; then he must decide on his mode of procedure, in oder to bring the young creature into one of the best positions for delivery—either natural or artificial—so that this may be effected with certainty and rapidity. The required assistants should be selected, and to each should be alloted his share in the operation, in which he ought to be instructed briefly and clearly; the instruments, cords, and other apparatus ought next to be placed in readiness; and then the task may be begun. Whatever is necessary to be done should be accomplished without delay, so as to spare the animal pain and exhaustion.

DIFFICULT PARTURITION FROM MALPRESENTATIONS OR MALPOSITIONS OF THE FŒTUS.

Considering the frequency of Malpresentations or Malpositions being the cause of difficult parturition or delivery, and their often-times serious character, they deserve the most careful study in order that they may be successfully overcome. It is very necessary that Normal Parturition, also How to Hake Successful Examinations in Difficult Parturition be thoroughly and carefully read before reading the following Malpresentations.

NATURAL—ANTERIOR PRESENTATION.

In this presentation the extended head and the outstretched forelimbs are toward the genital canal. As this presentation has been thoroughly explained and illustrated

under Normal Parturition, the reader will be referred to that subject.

DEVIATION OF THE HIND-LIMBS IN THE ANTERIOR PRESENTATION.

In this presentation the operator will either find the thighs of the foetus turned outward from its flanks, or the hind legs flexed forward, underneath the belly of the foetus, and the feet or fetlocks caught under the brim of the pelvis at the inlet, so that delivery by force, would cause the hind feet to penetrate into the abdominal cavity of the

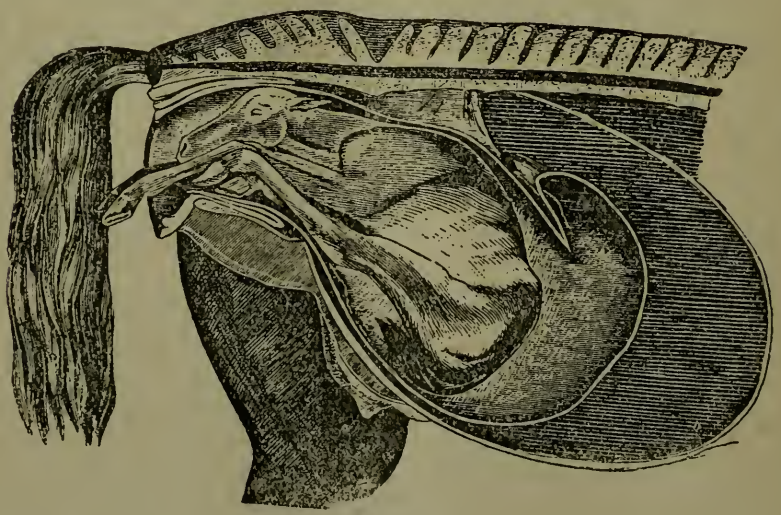

Fig. 22.

DEVIATION OF THE HIND-LIMBS IN THE ANTERIOR PRESENTATION.

mother, and this might cause the death of the mother and off-spring.

TREATMENT.—In nearly every case the preservation of the mother is the object to be attained. A safe delivery can be effected only by the proper adjustment of the hind legs. This is all the more difficult, when the foetus is well advanced in the passage and much traction has been employed. If upon examination, the thighs are extended outward from the flanks of the foetus, it should be forced

back within the womb and the limbs drawn as closely together as possible, with the hand. If this cannot be done with the hands, take a well greased half-inch rope, and fasten it around the body of the foetus with a running noose. (See Fig. 42.) Then the operator should work the rope just beyond the rump of the foetus, or midway between the rump and hocks. He must hold it there, while an assistant draws tightly on the rope and forces the thighs together. Then, with the proper traction the delivery can be completed. (See Traction.) If, however, the foetus cannot be forced back into the womb to adjust the thigh, cut the foetus off close up to the mother (see Embryotomy); then force the remainder back within the womb and deliver the hind feet first. If upon examination, the hind feet or fetlocks are found to be caught below the brim of the pelvis at the inlet, pass the hand between the belly of the foetus and the genital canal, until you come in contact with the feet or fetlocks. Then pass the palm of the hand against the feet or fetlocks, and extend it backward and inward as far as the arm will reach, when traction may be applied to the foetus and delivery completed. (See Traction.)

FORE-LIMBS CROSSED OVER THE NECK IN ANTERIOR PRESENTATION.

It is not uncommon to find Foals and Calves in this position, and unless due assistance is given, the mother usually is more or less lacerated. When the limbs are crossed at the poll, the feet are pushed against the roof of the vagina, causing laceration of that part. Sometimes they are pushed through the roof of the vagina into the rectum, producing rupture of the perineum. This position, which always retards delivery, is frequently recognized before an examination is made. If the fore feet are seen pressing against the roof of the vagina, at the outlet, the probabilities are that both legs are crossed over the neck.

If only one foot is seen pressing the roof of the vagina, or if both feet are observed on one side of the head, the one leg shorter than the other, only one leg is crossed. With these indications, no time should be lost in making an examination to ascertain the true position.

TREATMENT.—When only one limb is crossed, reduction is not difficult. The leg is seized a little above the fetlock, raised, drawn to its proper side, and extended into the genital canal. Delivery may then take place without help, or gentle traction on the head and limbs may be necessary.

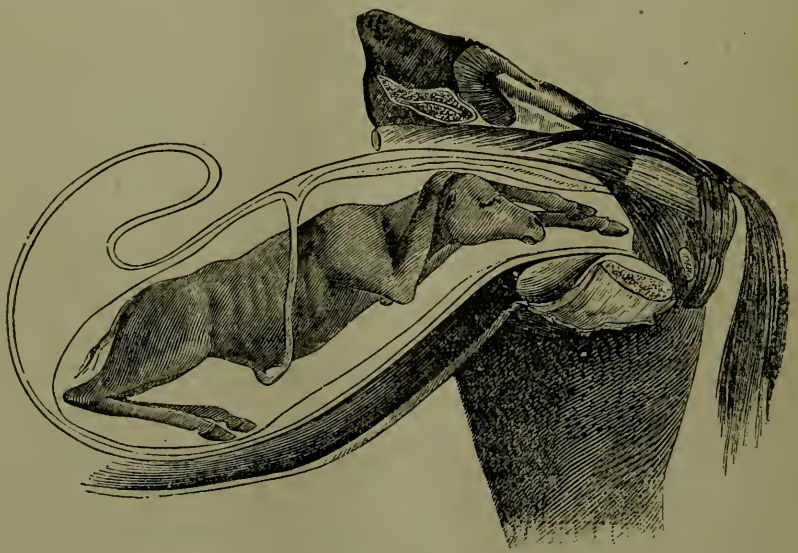

Fig. 23.

FORE-LIMBS CROSSED OVER THE NECK IN THE ANTERIOR PRESENTATION.

When both fore-limbs are crossed, and the foetus is not too far advanced in the pelvis, well greased half-inch cords should be fixed to each pastern (see Fig. 44), and then force the foetus back into the womb by pressing upon the head. Then the operator should place the feet on their proper sides, if possible. If he canot do this, bring the ropes to their proper sides, and, while the operator holds the head back firmly, let an assistant pull the rope on one side until that limb is brought into position. Then take

hold of the other rope and fetch that into position. Then place the head straight in a line above and between the limbs (as in Fig. 17), and delivery will be effected with but little traction.

If the foetus is so firmly fixed in the pelvis that it is impossible to force it back into the womb, then the limbs of the foetus must be amputated. (See Embryotomy.) However, this is a very exceptional occurrence.

FORE-LIMBS FLEXED AT THE KNEES.

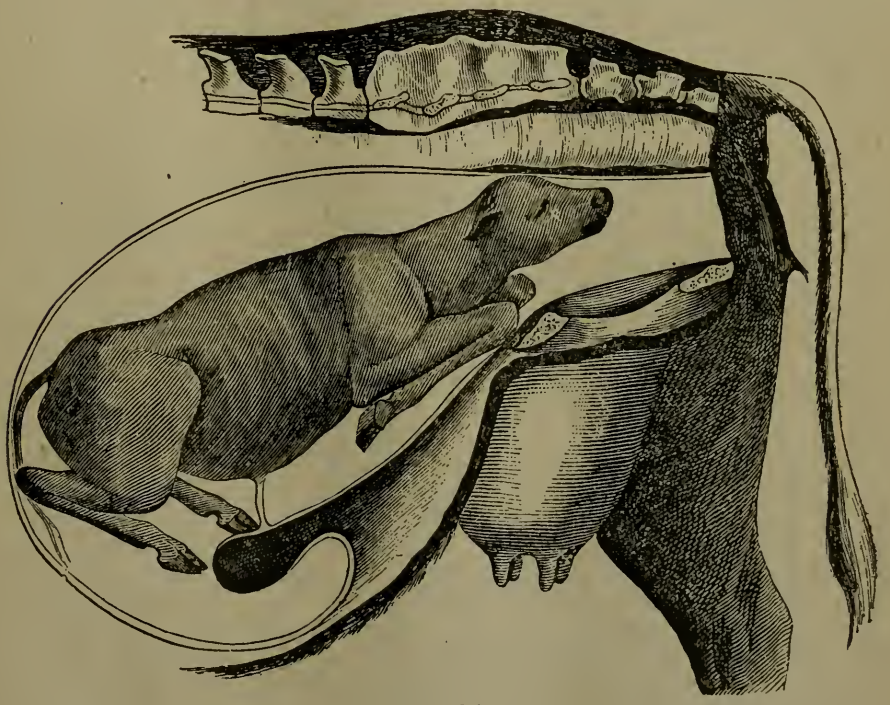

Fig. 24.

FORE-LIMBS FLEXED AT THE KNEES IN THE ANTERIOR PRESENTATION.

One or both of the fore-limbs may be flexed at the knee. This is a frequent and often troublesome complication. If an examination is made before labour has progressed any length of time, the nose and knees will be felt at the same time. But if labour has progressed any length of time, the operator will first come in cotnact with the

head, for sometimes it is advanced in the passage even as far as the outlet.

TREATMENT.—If the head has made but little progress, the operator will have but little difficulty. While ascertaining the position of the legs, it is almost always found that one has greater liberty than the other, and, if seized by the fetlock, can be thrown easily into its natural position. Then seize the other leg just below the knee, raise with the lower part of the hand (see Fig. 25), while pressing backward with the upper part of the hand, and that leg can be brought easily into position. Use the right

Fig. 25.

EXTENDING THE FORE-LIMBS IN THE ANTERIOR PRESENTATION.

hand to handle the left foreleg, and the left hand for the right foreleg.

If the head has been well forced into the passage or presented beyond the outlet, the case will have to be handled differently. First secure the head with a well-greased half-inch rope head collar (see Figs. 43 and 44), then grasp the head, and, during the intervals between the labour pains, force it back into the womb; then grasp the legs separately below the knees and raise them up, pressing backward at he knee and forward further down the leg, and in this way bring them into position one at a time. The operator must take hold of the knee and force it back into the womb, while an assistant draws on the rope. In this manner the leg will be forced upward and outward, into

the proper position. Then fetch the other limb up in the same manner.

REVERSED POSITION.—If the young animal is lying upon its back, with the legs turned upward within the womb, it will be impossible to extract it in that position. It must be turned, which is a difficult task.

In this, as in all manipulations of the mother if in a lying position, the hind parts should be raised higher than the fore quarters. Seize the foetus and fasten a small, greased rope around each fore fetlock, and another around the jaws. Then, if the foetus is slightly turned to the left, let the operator pass his right hand under the left shoulder. Have the rope attached to the right leg, pass out on the left side of the head. Then, at each labour pain, draw tightly upon the rope, and with the hand under the shoulder, raise up with a rotary movement. In the course of time the little creature will be completely turned around to the proper position. Proceed in a manner precisely the reverse, if the foetus is turned to the right. When the proper position is gained, delivery will be easy. If the mother can be kept in a standing position, the foetus can be much more easily handled.

FORE-LIMBS COMPLETELY RETAINED.

The complete retention of one or both of the fore-legs of the foetus within the womb, with head presentation, is often met with. With the Mare, the Foal usually dies before delivery is completed. With the Cow, the danger to the Calf is not so great. The Foal or Calf may be born with the fore-limbs retained, and without injury to the mother or off-spring. But this only occurs when the foetus is small, and the maternal pelvis roomy. However, with the multiparous animals this might almost be designated a normal presentation.

On examination, the operator's hand will first come in contact with the head of the foetus, if both limbs are

completely retained (Fig. 27); the head may be forced well into the vagina, even to the vulva, at each labour pain, but retracting immediately after each pain ceases. Sometimes it is with the greatest difficulty that the fore-legs are reached, owing to the vast dimensions of the womb. When the fore-limbs of the foetus can be felt, they are usually lying either immediately under its abdomen, or beside the chest and flanks. In some cases the head is also in an abnormal position. If only one limb is completely retained, the other

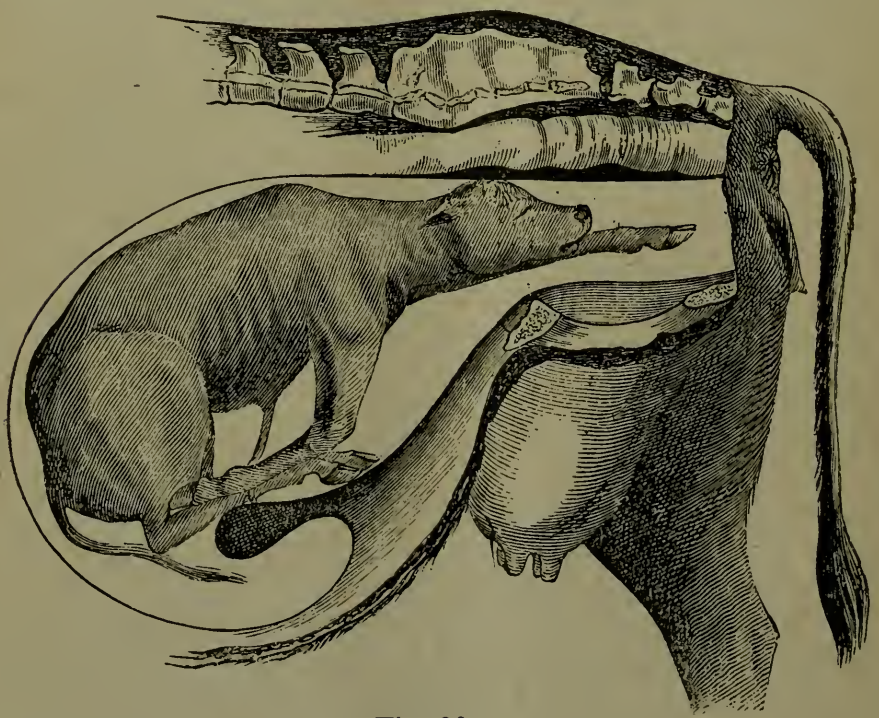

Fig. 26.

ANTERIOR PRESENTATION: ONE FORE-LIMB COMPLETELY RETAINED. (CALF).

will be in a normal position—alongside or under the head. (Fig. 26.)

TREATMENT.—Reach the limb or limbs with the hand. In order to do this it may be necessary to force the head back within the womb. If so, first place a rope around the neck and another around the lower jaw, then

force it back within the womb during the intervals between the labour pains, then pass another rope around the fore-arm of the foetus, pushing it well down toward the knee, and use gentle traction until the knee is brought up to the passage. Then fasten the rope to the fetlock, and have an assistant to use traction upward and outward, while the operator grasps the knee and forces it upward and backward into the womb. Next bring the other leg into posi-

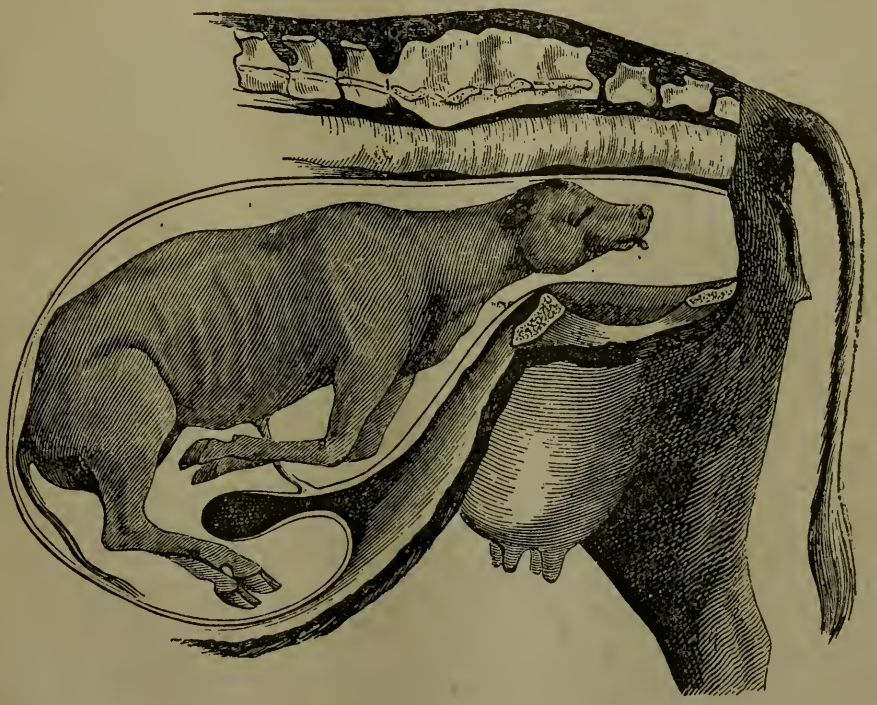

Fig. 27.

ANTERIOR PRESENTATION: BOTH FORE-LIMBS COMPLETELY RETAINED. (CALF).

tion, in the same way. Now having the limbs in the proper position, next find the head and place the hand under the nose and lower jaw, and have an assistant pull upon the rope which was fixed to the jaw, until the head is brought into position; only moderate traction will be required after this to complete delivery. (See Traction.)

If the head presents as far as the vulva and the foetus

is dead, peel the skin back from the head to the neck, allowing the skin to remain intact; then remove the head at the first or second joint of the spine, taking care that the end of the bones are covered with the skin of the head. (This will prevent laceration.) Then fasten a well greased rope to this part, and push back within the womb, the limbs can then be extended, and extraction may be effected. Should delivery still be impossible, then the foetus must be extracted by piecemeal. (See Embryotomy.)

In the Sheep, Goat, Sow, Bitch, and Cat, forced extraction is usually practiced with success. (See Traction.)

Fig. 28.

ANTERIOR PRESENTATION: DOWNWARD DEVIATION OF THE HEAD. (FOAL).

DOWNWARD DEVIATION OF THE HEAD, ANTERIOR PRESENTATION.

The deviation may be slight (Fig. 28), or it may be great, which is termed extreme downward deviation of the head (Fig. 29). This presentation occurs most frequently when the foetal membranes are prematurely ruptured.

On making an examination, the hand of the operator will come in contact first with the feet, and next with the top of the head, which will be recognized by the ears, eyes,

nape of the neck, and if a Foal by the forelock and mane. The upper ridge of the neck is always a safe guide to follow in discovering the direction of the head.

TREATMENT.—When the deviation is slight the operator should, during the intervals of straining, press backward and upward against the top of the head; then pass the hand down under the nose, seize the lower jaw and raise upward and outward, bringing the head into

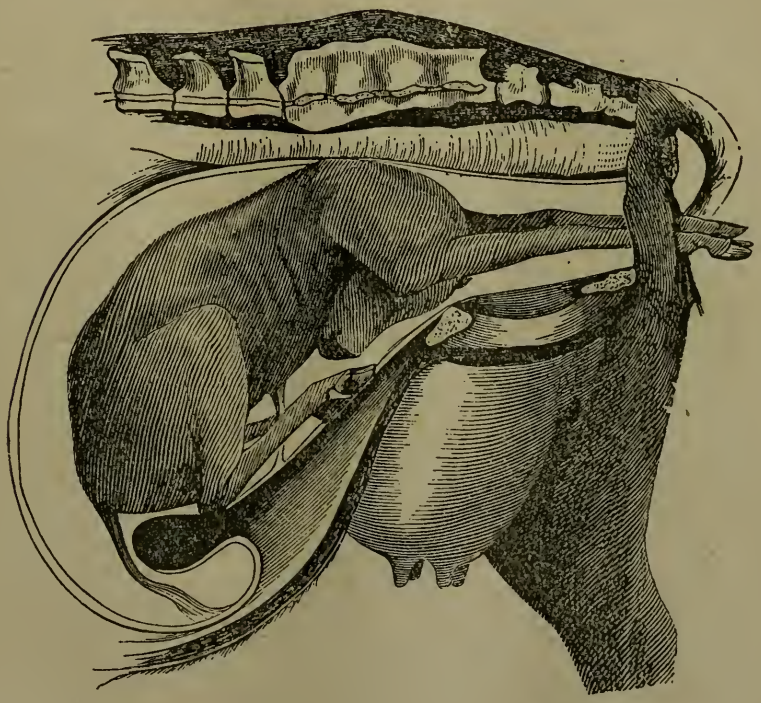

Fig. 29.

ANTERIOR PRESENTATION: EXTREME DOWNWARD DEVIATION OF THE HEAD. (CALF).

the natural position (See Fig. 17). Now bring the head into the passage and complete delivery in the usual way. However, if necessary, a rope may be applied to the upper jaw as described in Extreme Deviation of the Head, which will soon be alluded to.

The same procedure is necessary with the Sheep and

Goat; while with the Bitch and Cat delivery must be effected by means of forceps.

In Extreme Deviation, with the head bent under the body, the case is most difficult, and especially when there has been delay or much traction on the foetus in attempting to deliver it.

The contractions of the closely applied womb render attempt at delivery almost impossible, by their paralyzing the hand and arm. Large quantities of warm flaxseed tea or warm raw linseed oil must be injected into the vagina. With a crutch or repeller (Figs. 51 and 52) placed at each shoulder of the foetus, push it back within the womb, and pass the running noose (Fig. 42) of a well greased rope around the upper jaw, and while an assistant pulls at this, the operator, by pressing strongly against the top of the head, may bring the nose into the normal position (Fig. 17). Should this fail, then the animal should be thrown on its back; the success which has attended this change of attitude in so many recorded instances, should induce the obstetrist to adopt it without much delay. Very often the altered position of the mother at once disengages the head of the foetus; if this does not happen, then undoubtedly embryotomy will be necessary. (See Embryotomy.) Indeed, it should be resorted to early if the foetus is dead, which is nearly always the case in the Mare. Place a rope around the bend in the neck, and amputate the fore-limbs first, as in many cases the removal of one fore-limb will permit delivery; but it is generally necessary to pull on the rope that was placed around the neck. Sometimes it will be found necessary to amputate both fore-limbs, also the head. These operations are throuoghly explained under Embryotomy (which see).

LATERAL DEVIATION OF THE HEAD TO THE RIGHT OR LEFT.

This is a very serious obstacle to birth, and is frequently one of the most difficult to overcome. It is also one of the most frequent deviations. It is due to precipitate or tumultuous labour, with the mouth of the womb either imperfectly or not at all dilated. The contractions of the womb propel the head of the foetus towards the pelvis; but

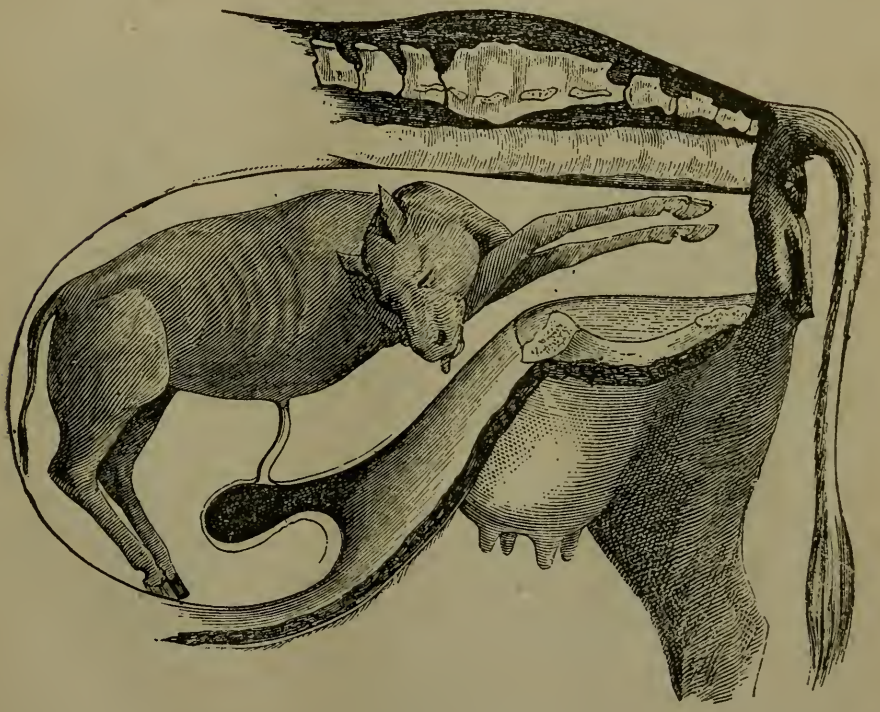

Fig. 30.

ANTERIOR PRESENTATION: LATERAL DEVIATION OF THE HEAD TOWARDS THE SHOULDER. (CALF).

as the mouth of the womb is not open, and as the impelling force continues, the body pushes the nose against the occluded mouth of the womb, and turns it to one side; then the deviation becomes increased with every contraction. Premature escape of the "waters," spasms of the neck of the womb, and torsion of the womb may also cause it. In some instances there can scercely be any doubt that the deviation

has taken place some time before gestation is completed, as in many Foals at birth the neck cannot be straightened, and the head is distorted.

On examination it is not difficult, as a rule, to distinguish lateral deviation. Usually both fore-feet are in the genital canal, but birth does not progress. An important fact to remember is that one limb—that belonging to the side to which the head is bent—seems to be shorter, or less

Fig. 31.

ANTERIOR PRESENTATION: LATERAL DEVIATION OF THE HEAD TOWARDS THE ABDOMEN. (CALF).

advanced, than the other. The hand on being passed beyond these toward the inlet, comes in contact with a convex mass, which renders access to the cavity of the womb difficult. Patient exploration discovers this mass to be the bent neck; and if it is a Calf, owing to the shortness of the neck, the head is soon found, and recognized by the ears, eyes, and often the muffle turned toward the shoulder.

With the foal the neck being longer, makes it much more difficult to reach the head. This difficulty is greatly increased if the abdomen of the mother is very pendulous.

TREATMENT.—If the head can be felt by the hand, catch hold of the cheeks, by slipping the fingers into the mouth, and raise the head into position. If it cannot be brought into position in this way, then slip a well greased, running noose (Fig. 42) around the lower jaw, secure the fore-limbs with ropes and push the foetus back into the womb. Then have an assistant pull on the rope which is attached to the jaw, while the operator pushes inward on the neck just at the bend. Bring the head into the vaginal passage, draw up the feet and complete delivery.

In case the feet present and the head cannot be reached by the operator, it will be necessary to fasten small greased ropes to the fore fetlocks; then return the fore-limbs to the womb, pressing them to the opposite side from that to which the head is bent. Then if the head is turned to the right, press against the left shoulder; if to the left, press against the right shoulder. With the hand or a crutch, fasten a rope around the neck, and pass the rope along the neck until as near the head as possible; then twist the rope until it presses deeply into the flesh of the neck, care being taken not to entangle the membranes in the rope. Now press inward on the shoulder and draw outwards and sideways on the rope which is around the neck, and the head will be drawn backward toward the natural position. Continue in this until the head is reached, when a rope should be fastened to the head or lower jaw, after which it can easily be brought into position. Then draw up the feet and complete delivery.

When it is found impossible, or not advisable, to attempt adjustment of the head and neck, then recourse must be that of Embryotomy (which see).

With the Sheep and Goat, this deviation must be remedied by forced extraction with the short blunt hook or

finger-hook (Figs. 53 and 54), the fore-limb of the foetus being manipulated so as to push away the unencumbered shoulder into the womb. The smallness of the genital passages in these animals is an obstacle to manipulation, but an intelligent boy with a small hand may be of much service when acting under the direction of the obstetrist.

With the Bitch and Sow these deviations are extremely rare. When they do occur it will be found that the forceps will generally effect forced extraction; or a piece of strong catgut, or brass or copper wire, may be passed around the bend of the neck. Traction on this will either remove the foetus, or by cutting through the neck permit it to be extracted by the forceps. (See Forceps.)

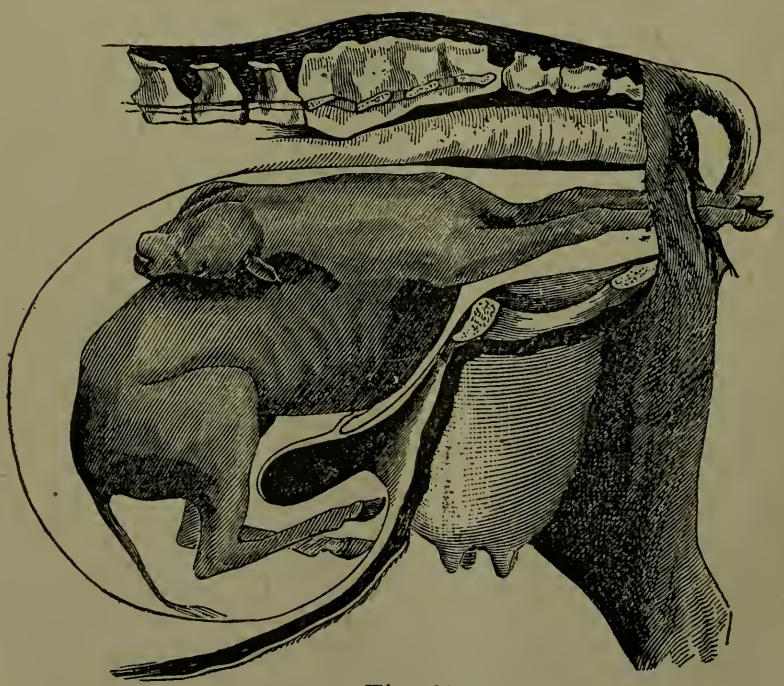

Fig. 32.

ANTERIOR PRESENTATION: DEVIATION OF THE HEAD UPWARDS AND BACKWARDS.

DEVIATION OF THE HEAD UPWARD AND BACKWARD.

In this position, the head will be found more or less extended along the back, or slightly deviated to one side, with the lower jaw resting against the mothers back. This position may lead to rupture of the womb and rectum, and the delivery of the foetus by the rectum.

On exploration, the fore-limbs may be found more or less advanced in the vagina. On deeper exploration, the hand meets the chest, while above it is the front part of the neck, with the wind-pipe leading upwards to the head.

TREATMENT.—It is necessary to force the foetus back within the womb by pressing the chest downward. Should the head not drop down into the natural position, it will be necessary to seize the head by the mouth or lower jaw and bring towards the mouth of the womb, by carrying it downwards and a little to one side if necessary, by a slightly screwing motion. If the head cannot be brought forward with the hand, place a small rope around the lower jaw and have an assistant pull, while the operator guides the head with his hand until it is brought into the natural passage, when delivery will be completed easily. This is not a difficult position and can be rectified with ease and safety. Embryotomy is rarely necessary.

In the smaller animals—at least in the Bitch—delivery has been effected without bringing the foetus to the natural position.

HEAD RETAINED, AND WITH IT ONE OR BOTH OF THE FORE-LIMBS.

These complicated cases are seldom met with. But when they do occur, it is usually preferable to adjust the limbs first, then the head; but it sometimes happens that it is more advantageous to begin with the head—for instance, when it is much forward in the womb. But it is really of

no great moment which part is first dealt with, so long as the precaution is taken first to cord those which are deviated. Then the procedure will be the same as described under the deviation of that part.

NORMAL POSTERIOR PRESENTATION.

In this position the hind-limbs are fully extended backwards, and are the first to enter the genital canal. This presentation has been explained and illustrated under Normal Parturition (which see).

HOCK PRESENTATION.

This presentation usually results when there is a posterior presentation, and the womb contractions force the foetus towards the neck of the womb, before the hind-limbs

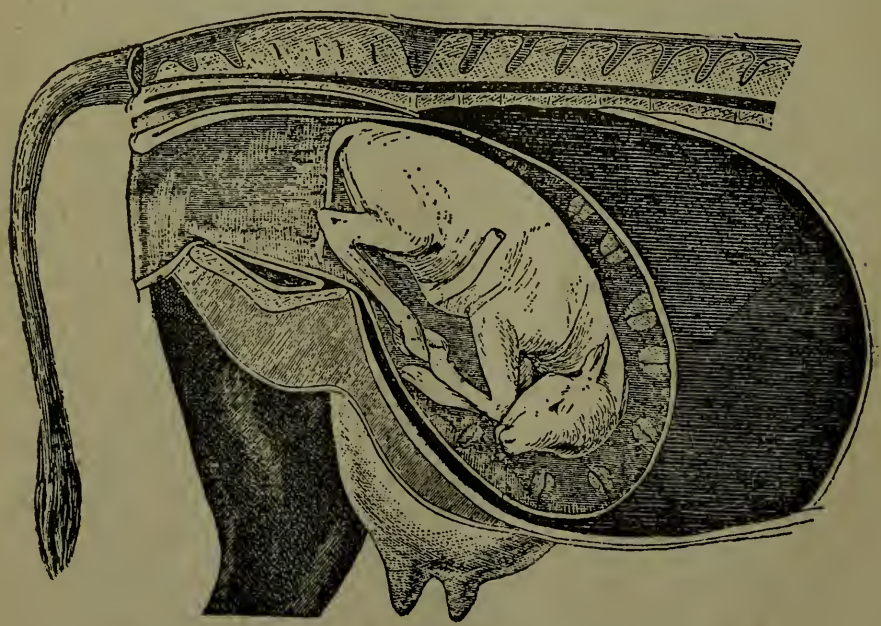

Fig. 33.

POSTERIOR PRESENTATION: HOCK. (CALF).

are completely extended. (Fig. 33.) As labour advances the croup has a tendency to descend, and with the points of the hocks, to advance through the mouth of the womb. The double legs and croup, jammed in the inlet, form far-

too large a mass to advance further. Labour is, therefore, suspended, and the animal becomes exhausted with futile straining.

On making an examination, the point of the hock is always the first part the hand of the operator encounters; but it may be found at various depths. Sometimes the hocks alone are in the canal, the body of the foetus being still in the womb: while in other cases both the hocks and the croup are wedged in the passage.

TREATMENT.—With the larger animals at their full period of pregnancy, birth cannot take place, as a rule until the malpresentation has been rectified; and to attempt delivery before this has been done is to expose the Cow or Mare—particularly the Mare—to great danger. With the Sheep, Goat, Sow, and Bitch, the foetus can be, and often is, extracted in this malposition by forced extraction. With the Mare and Cow it is necessary to give the hind-limbs a favorable direction, by extending them into the genital canal. In adjusting the hind-limbs, it will be necessary to push the foetus as far as possible into the womb. This can be effected without difficulty—even in the Mare—at the commencement of parturition, when the foetus has not yet entered the pelvic inlet, or, at most, the points of the hocks are only engaged. But when labour is more advanced, and the hocks with the croup is wedged in the passage, the difficulty is greatly increased in the Cow, and even in the Mare it may be impossible to push the foetus back into the womb. However, it should always be attempted. This is best accomplished by raising the hind-quarters of the mother as much as possible; then the hand should be applied to the buttock of the young creature, the thumb on one hip, the fingers on the other, and immediately below the tail. If the repeller or crutch (Figs. 51 and 52) is used (and it is very convenient in these cases), it should be placed across the thighs. The foetus should be steadily forced back in the intervals between the labour-pains; this

force should be directed slightly upward, so as to raise the croup. At first the resistance seems to be insurmountable, but gradually the foetus begins to move, and finally is forced sufficiently into the womb, to allow the hind-limbs to be seized; the hand may then fasten a small, greased rope on each pastern (by means of the porte-cord (Fig. 49), if necessary). Next flex one limb as completely as possible, commencing with the lower leg and lifting it well up against the thigh, then the hock is bent; the limb is now seized at the lower end of the cannon-bone, or even at the fetlock, and is then lifted into the vagina. The same procedure is carried out with the other leg. With the Foal it sometimes happens that, owing to the length of the limbs, the foot of the foetus jams on the pubis of the mother. In such cases the cord attached to the pastern is most useful, as the operator may allow the foot to pass from his hand, and press the point of the hock towards the womb; while an assistant pulls at the cord at such times, and with the amount of force, as the obstetrist may order.

It frequently happens that the foetus cannot be forced back into the womb. When this occurs with the Mare, it may be presumed that the foetus no longer lives, or that it will perish before delivery is completed. There can be no objection, then, in resorting to Embryotomy (which see), so as to relieve the Mare as quickly as possible.

With the Cow, the Calf is very frequently alive, and an important consideration is how to deliver it in this condition. Should it be impossible to force the Calf back into the womb, forced extraction in this malposition should be attempted (See Traction); it has often proved successful, and particularly when only one limb was retained. To effect forced extraction with one limb alone flexed, the leg extended in the vagina should be corded at the pastern, or above the hock if this can be reached. A cord is then to be passed around the bent hock by means of the porte-cord (Fig. 49), and traction exercised during the labour-pains.

When both legs are flexed at the hocks, a cord must be passed around each, as in Fig. 34. The necessary force can then be exercised. Should forced extraction not succeed, the limbs may be amputated, as with the Mare. (See Embryotomy.)

In the posterior malpositions, it is well to ascertain the direction of the tail; as it is sometimes thrown back

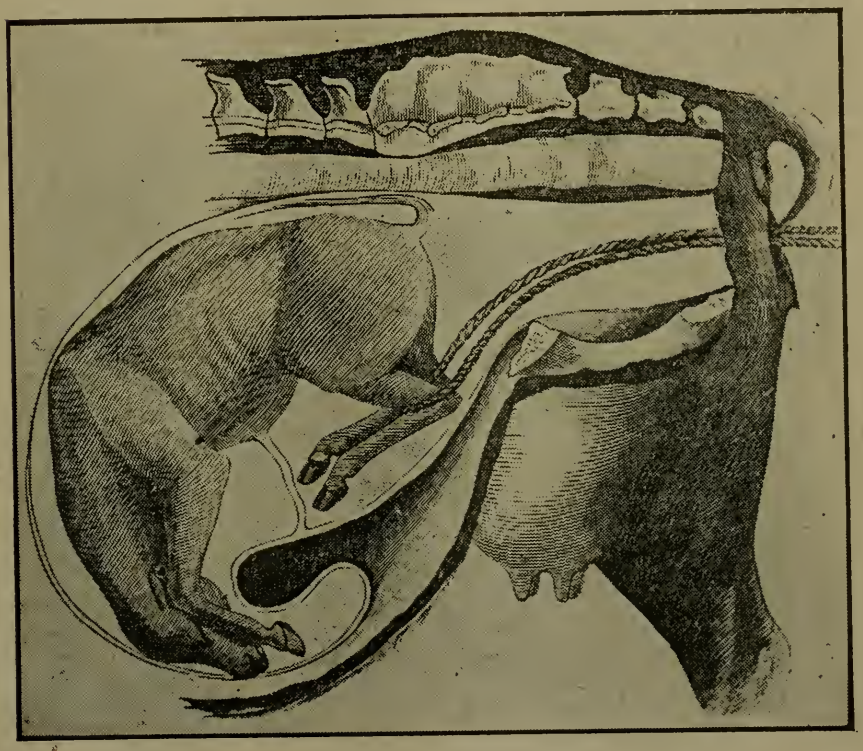

Fig. 34.

HOCK PRESENTATION: HOCK CORDED. (CALF).

over the croup (as in Fig. 34), and may thus increase the difficulty. It may readily be brought back to its natural position by passing the hand from the root to its extremity, and bringing it into the vagina by withdrawing the arm. In some instances it may be necessary to force the foetus into the womb before the tail can be adjusted.

With the Sheep and Goat the same procedure is ap-

plicable, but the Bitch, Sow, and Cat, generally does not experience any difficulty in expelling the foetus when in this position. Therefore, they do not require any especial attention.

THIGH AND CROUP PRESENTATION.

The cause of this malposition is the same as that operating in hock presentation. Authorities are generally unanimous in asserting that this is one of the most difficult mal-

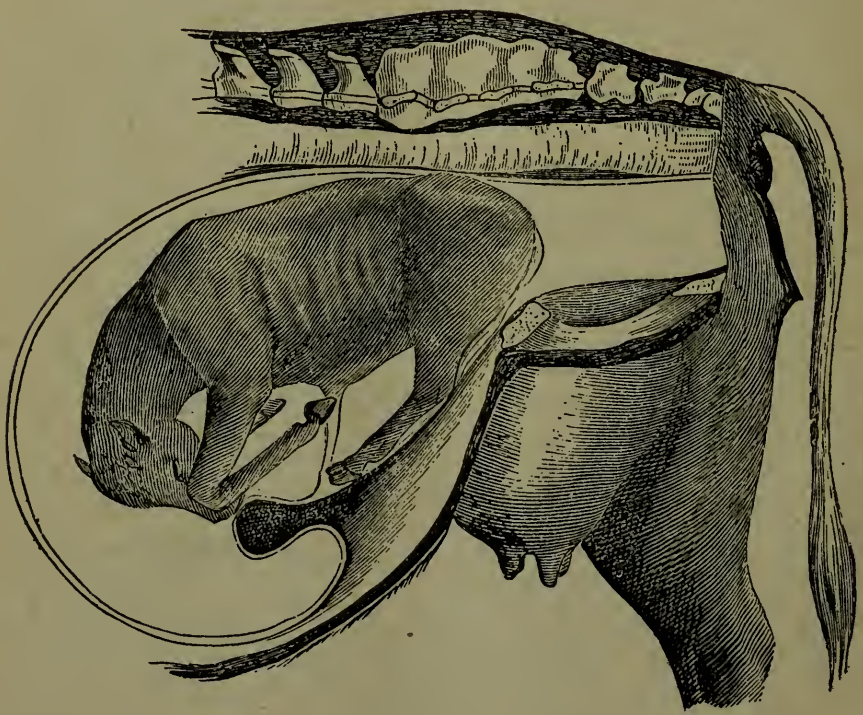

Fig. 35.

THIGH AND CROUP PRESENTATION. (CALF).

positions the obstetrist can encounter. Very frequently the mother perishes without being delivered; and though sometimes a live Calf may be extracted, it is rare that a living Foal is obtained.

On examination, the tail and buttocks of the foetus are the first parts that the hand encounters; then the croup and haunches, and below, beneath the pubis, are found the

hocks; though, when the limbs are fully extended under the body, they are beyond reach.

TREATMENT.—The first rational indication is to extend the limbs of the foetus backward. This is often most difficult to fulfill, though it is possible when labour is not too far advanced, and when the foetus can be pushed sufficiently from the inlet to allow one limb to be seized above the hock, and the thigh and leg flexed as completely as circumstances will permit. Still pushing the foetus off by means of the repeller (Figs. 51 and 52), the hand is passed down to the foot, until the toe and front part rest in the palm of the hand; by adopting this precaution, danger of injury to the womb or vagina is averted. Then the foot is brought into the vagina by flexing all the joints on each other. Again pushing the foetus forward, the same manoeuvre is repeated with the other limb, if necessary; forced extraction has succeeded with only one leg in the passage, and sometimes with little difficulty. But forced extraction of the foetus, without adjustment of one leg, is very serious, and is most always fatal to the mother, as well as the offspring.

If the examination is delayed until parturition is somewhat advanced, the operator may find the croup well wedged in the pelvic canal and the thighs to have cleared the inlet. When this occurs it is often impossible to force the foetus back within the womb. Throwing the mother on the back or side may effect a change for the better in the position of the foetus; or, if lying, then raise the hindquarters. Should this fail, there are but two courses open—forced extraction of the foetus in this abnormal position, or removing it by embryotomy.

Lecoq's method of forced extraction consists in passing the hand, furnished with a rope, between the pelvic wall of the mother and the body of the foetus, as far as the thigh of the foetus; the rope is then pushed beneath the thigh as far as possible and left there, while the hand is passed

above—between the leg and body, so as to bring the end of the rope up around the stifle and back through the vagina. In this way the thigh is encircled by a loop, as in Fig. 36. The other thigh should be secured in the same way by another rope. The ends of the ropes being joined together outside, assistants, under the direction of the operator, pull with the necessary amount of force (See Traction); while the hand of the operator assists in the vagina, either in guiding the foetus, seizing on and pulling at any part that may offer, or smoothing down the folds of the lining membrane in the canal, which might otherwise increase the ob-

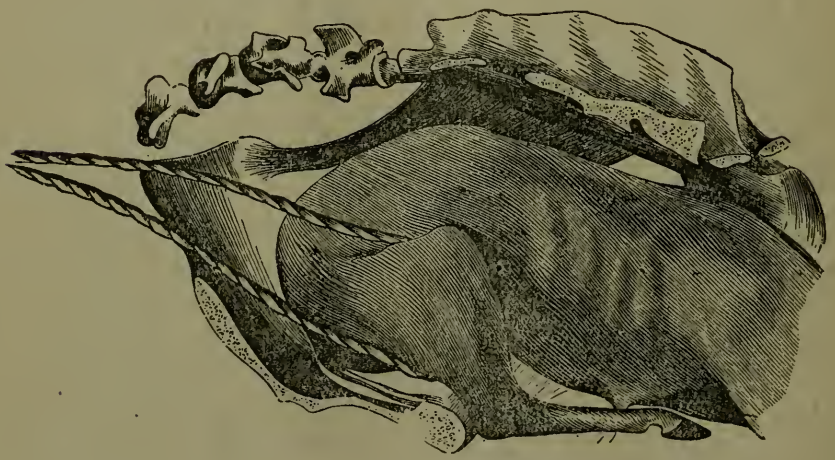

Fig. 36.

THIGH AND CROUP PRESENTATION: THIGH CORDED. (FOAL).

stacle. The foetus has been extracted alive by this procedure, but this is a rare occurrence; and more frequently the foetus, or mother and foetus, perish. Therefore, embryotomy is usually resorted to in preference to forced extraction. (See Embryotomy.)

The Bitch, Sow, and Ewe, may be delivered by the forceps (Fig. 56), small crochet (Figs. 53 and 55), or the tube-noose (Figs. 47-48), which are described under their various headings.

TRANSVERSE PRESENTATION.

The foetus is in a transverse position, when, upon examination, the hand of the operator first encounters the shoulders, withers, sides, flanks, haunches, loins, back, breast, belly, or all of the limbs collected together.

BACK, LOIN, AND SHOULDER PRESENTATION.

The withers are recognized by the prominences which the spinous processes form at this part; the thin, wedge-shaped outline of the part. The region of the loin may be distinguished by the large and almost level surface it offers; the hollow of the flank leading to the thigh and stifle. The back is discovered by the arches of the ribs springing from

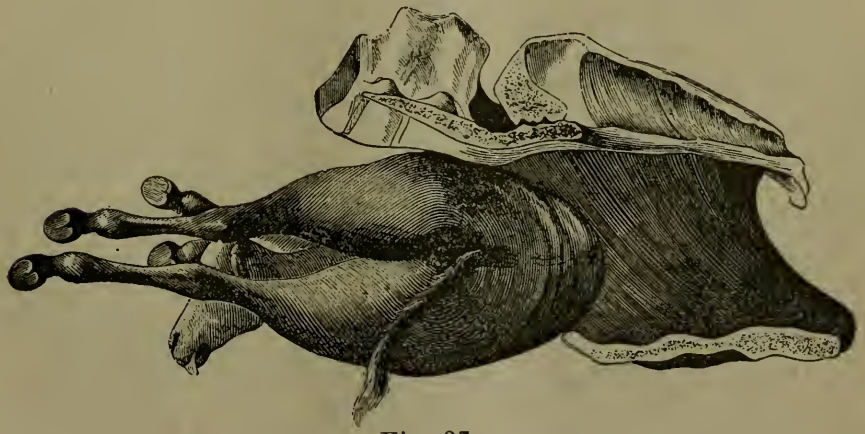

Fig. 37.

TRANSVERSE PRESENTATION. (FOAL).

each side. After determining which part presents, it is necessary to ascertain the direction in which the head lies, before attempting to rectify the position.

TREATMENT.—If the "waters" have escaped and the womb and vagina are dry, inject warm flaxseed tea into them. Now the principal object is to turn the foetus, and convert the transverse position into either an anterior or a posterior presentation, for only in this way can delivery be effected. If the position of the foetus is such, that the fore-limbs are most convenient, and can with the least difficulty

be brought into the pelvic inlet, the position should be converted into an anterior presentation. If the hind-limbs are more accessible and can be brought into the inlet with less difficulty, convert the position into a posterior presentation. The flaxseed injections into the womb, together with the contractions of the womb, and the operator forcing the foetus forward within the womb in an oblique direction, opposite that of the part which is to be brought into the inlet, will, in many cases, cause,

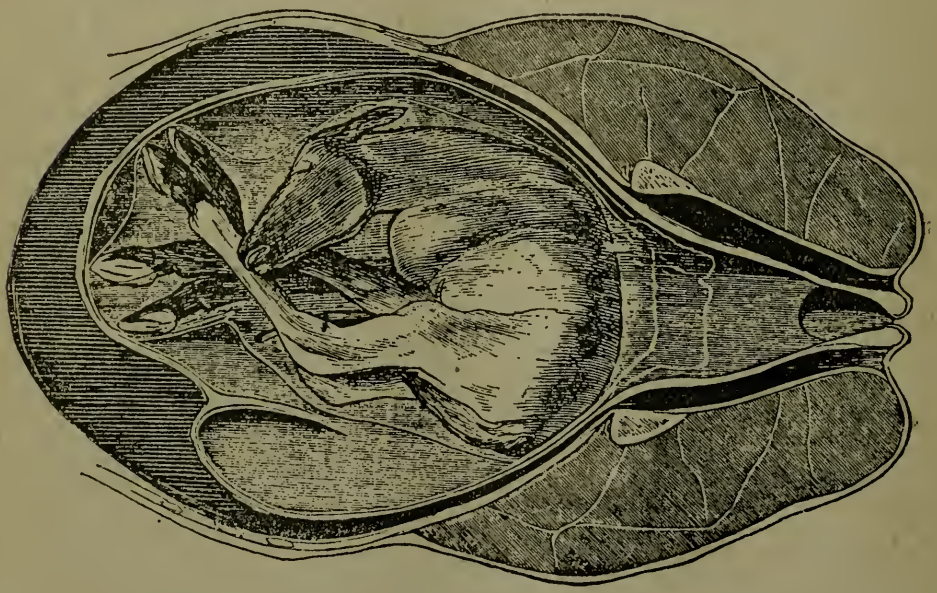

Fig. 38.

TRANSVERSE PRESENTATION WITH SHOULDER AND LOIN PRESENTED. (FOAL).

the body of the foetus to glide around the inner surface of the womb, until a convenient part presents. Now the operator must ascertain if the limbs, and if anterior presentation, the limbs and head, are in the proper position (See Figs. 17 and 18), before bringing them into the passage. If they are not, adjust them and bring into the passage by means of the hand, or if much traction is necessary, a rope may be used with advantage. But in either

case it will be necessary to guide the foetus with the hand. The Ewe and Goat will require the same manipulation as the Mare and Cow. With the Bitch and Cat the foetus will be more successfully turned into a normal presentation by means of the forceps and external abdominal manipulations.

BREAST AND ABDOMINAL PRESENTATION.

In this position the foetus is placed horizontally across the womb, the legs flexed or extended toward the inlet.

On examination, as the operator passes the hand to

Fig. 39.

TRANSVERSE PRESENTATION: SHOULDER AND LOIN PRESENTED. (FOAL.)

explore the parts, it first encounters the feet—usually all four of them. They may be in the womb doubled against the body of the foetus, or they may be in the genital canal, and even protrude from the vulva. In the majority of cases, either the hind-quarters or the fore-quarters are near the passage, a condition recognized by the legs of that part being further advanced than those of the other. The direction of the head must be ascertained, which is readily de-

termined if the head can be felt. If this is impossible, then a careful examination of the limbs will be necessary. To distinguish between the hind-limbs and the fore-limbs, read the paragraph explaining this, under How to Make Successful Examinations in Difficult Parturition. It must be remembered that in this presentation, the fore-limbs and hind-limbs are across each other, when engaged in the genital passage. The hind-limbs, crossing the fore-limbs, are pointing towards the head or anterior part of the body of the foetus; while the fore-limbs, crossing the hind-limbs,

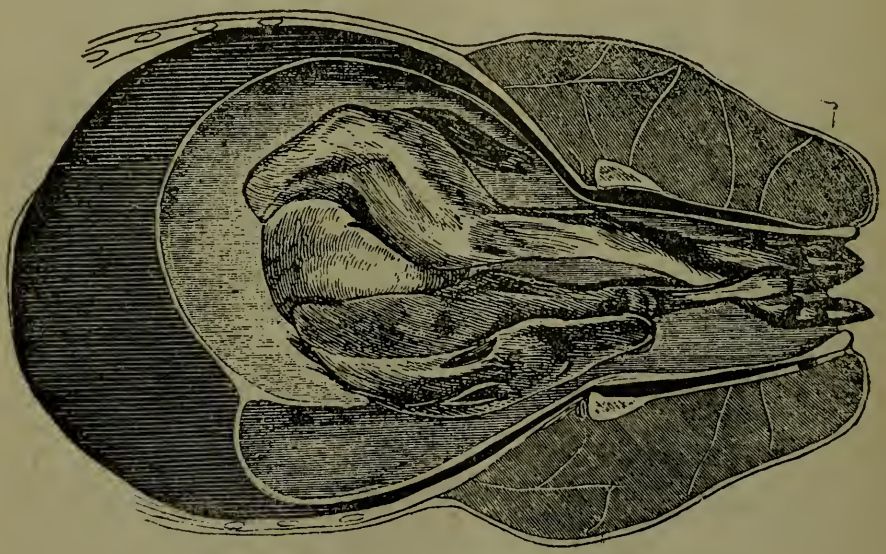

Fig. 40.

TRANSVERSE PRESENTATION: BREAST AND ABDOMEN PRESENTED, HEAD AND FEET ENGAGED. (FOAL).

point toward the posterior part of the foetus. As a rule, this is not a very serious presentation. The gravity of the case depends somewhat upon the length of time labour has been in progress. It is impossible for birth to occur while the foetus is in this position, and if the mother does not receive the necessary aid in due time, her straining may not only cause the death of the foetus, but the mother will likewise perish from prostration.

TREATMENT.—Generally the operator will find it advantageous to convert the position into a posterior presentation and deliver the hind feet first. Fasten well greased ropes around the limbs which are to be extracted first. If only one hind-foot and one fore-foot are engaged in the passage, fasten a rope around one hind foot and search for the other one; secure it, and bring it into the passage. Now return the presenting fore-limb to the womb, forcing it as far

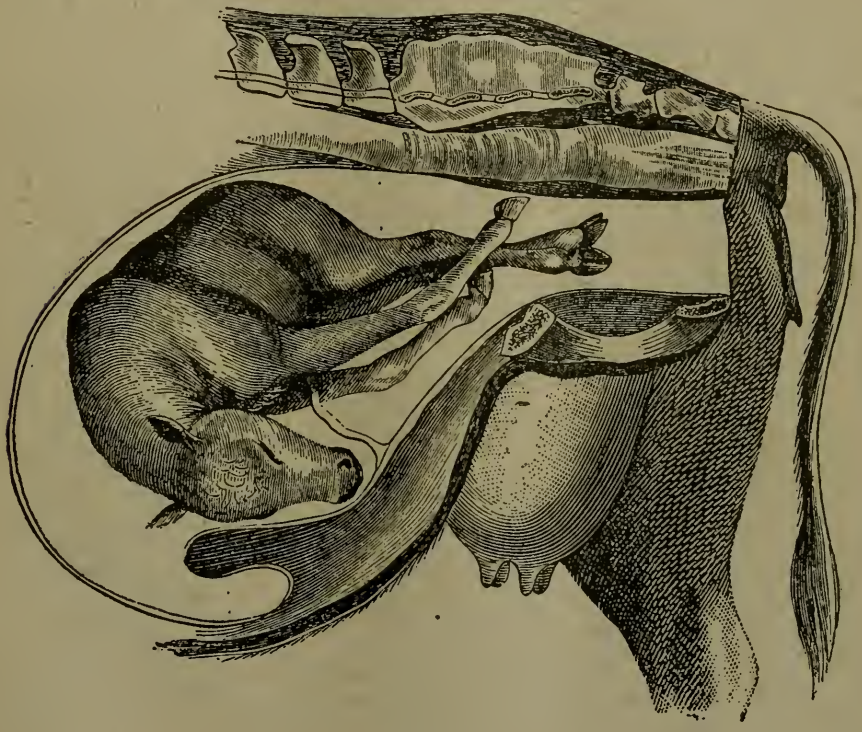

Fig. 41.

TRANSVERSE PRESENTATION: BREAST AND ABDOMEN PRESENTED, HIND-LIMBS MOST ADVANCED, HEAD RETAINED. (CALF).

in as possible, apply traction and deliver.

If all four feet are presented in the passage, fasten ropes to the hind feet; then return the fore-feet as far as possible within the womb. Sometimes this is more easily accomplished by flexing the fore-limbs at the knee, until

the foot rests against the elbow; then force it within the womb in a downward direction, while the assistant draws upon the hind-feet. With this manipulation the foetus will generally straighten out, and with slight traction birth will soon be completed. But when the hind-legs, croup, and hips have been delivered, the operator should pass his hand between the belly of the foetus and the floor of the genital canal, to ascertain if the fore-limbs have become cramped or fastened within the inlet. If so, straighten them by pushing them inward, for if not straightened, serious results might follow. Even if the head is engaged along with all four limbs in the passage, it is preferable to return it to the womb in a downward direction along with the fore-limbs, and that delivery be made with the hind-feet first.

It is well that he operator bear in mind the necessity of the back of the foetus being placed against the back of the mother, before attempting delivery, whatever the presentation may be.

In those cases in which the foetus has the limbs doubled against he body, and can only be touched with the tips of the fingers of the operator, the hind-quarters of the mother should be lowered by placing her on a sloping floor —on the back if necessary; an assistant then manipulates the foetus through the abdominal wall, so as to move it toward the inlet, where one or more of its limbs may be secured by the operator. The procedure will then be the same as the above.

In the breast and abdominal presentation, if it is found impossible to force the foetus back into the womb and the foetus is dead, there should be no hesitation about resorting to embryotomy (which see).

The foregoing indications and treatment are applicable to the Sheep and Goat, as well as the Mare and Cow. With the Bitch and Cat, the foetus can be more successfully turned or converted into a normal presentation, by means

of the forceps (Fig. 56), and external abdominal manipulation.

MALPRESENTATIONS OF TWIN FOETUSES.

Difficult parturition is sometimes present during the delivery of twin foetuses. This is usually due either to one or both presenting in a malposition, or both presenting at the inlet together. As they cannot pass through the canal together, hence the difficulty. For illustration of Twin Foetuses in the Normal Position, see Fig. 11.

On examination, it is sometimes found that the limbs of the twins are so interlaced that they are separated only with the greatest difficulty. But they must be separated; and then the operator has to determine which one presents the most favorably. If assistance is not afforded before both foetuses become wedged into the pelvic inlet, the operator will experience great difficulty in adjusting them. But if distinguished before entering the inlet, but little trouble need be anticipated.

TREATMENT.—After untangling and selecting the foetus which presents the most favorably, fasten ropes to the head and fore-limbs or to the hind-limbs, as the presentation may be, and arrange them in a direction proper for delivery. Then an assistant by means of the ropes, draws the foetus toward the outlet, while the operator pushes the other foetus back into the womb. After delivering the first one, search for the other, which probably will be in a malposition, requiring adjustment before it can be born. The procedure in this case will be the same as if only a single foetus had been delivered.

MECHANICAL MEANS AND INSTRUMENTS USED FOR THE EXTRACTION OF THE FŒTUS.

MECHANICAL DILATATION OF THE MOUTH OF THE WOMB.

If the fingers and hand are to afford the means for dilatation of the mouth of the womb, they must be well oiled, or smeared with extract of belladonna, and introduced in the form of a cone, towards the mouth; if they cannot be passed into the canal in this shape, then the insertion of one

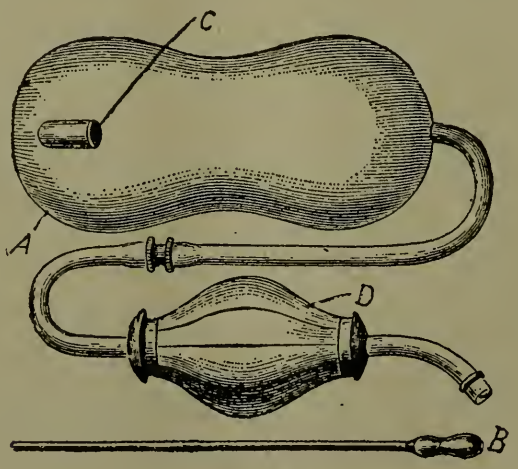

Fig. X.

WOMB DILATOR.

finger may be attempted, followed by a second, and so on until the hand has been pushed through. Very frequently this cannot be accomplished at the first trial, nor yet at the second; but with patience and judgment it rarely fails, and if conducted with the care and gentleness which all operations of this kind should receive, such manipulation may be attempted without the least danger at intervals of a few hours, until crowned with success. The condition of the mouth of the womb should be ascertained, after a certain period has elapsed since the last attempt, every precaution

being adopted to prevent injury; and an entrance to it ought only to be effected when the resistance has greatly diminished, and can easily be overcome.

Mechanical dilatation of the mouth of the womb by means of the sponge tent has been much and successfully employed. The tent can usually be purchased at the druggist's, but if not it is easily made as described in the treatment of sterility (which see). Of course, the size of the tent varies according to the size of the animal. The sponge-tent is especially indicated when the object is to induce labour.

The womb dilator (Fig. X) is very useful, as it dilates the mouth of the womb in the same manner as the natural "water-bag." The bag (A) when in an empty condition, is introduced into the mouth of the womb by means of a whalebone sound or director (B), which fits into a small pocket (C) at the side; it is pushed through the canal until the pocket end projects into the womb; then warm water is steadily injected into it by means of the tube and bulb (D) attached to the other end. When filled with water the bag remains in the mouth of the womb, in consequence of the middle portion being narrower than the two ends. A simpler, and perhaps as useful, a contrivance, can be constructed from the fresh bladder of an animal securely tied to a bulb syringe and used in the same manner as Fig. X. Also see treatment for Hurried Labour in Normal Parturition.

CORDS—ROPES—BANDS.

Ropes and bands are, of all mechanical means, the most useful in veterinary obstetricy. They vary in thickness and length; they are usually about five or six feet in length, and if spun rope, from a quarter to half an inch or more thick. At one end may be a loop (Fig. 42), or iron ring (Fig. 50), by which to form a running noose (Fig. 42). If a somewhat stiff loop is required, it is very useful

to have a long piece of copper wire twined in the cord. Ropes should be thoroughly cleansed and greased before using. As ropes readily absorb germs and septic matter, it is never safe to use the same rope a second time. Some practitioners are very careless about this, and the result is usually unsatisfactory.

For the jaw the cord should be rather thin and soft, but strong. To render a hard cord softer, it may be partially untwisted at the part intended to go around a portion of the foetus.

When running knots or loops are made, these should be so tied that there is no chance of their becoming untied through slipping, when they come in contact with lubricat-

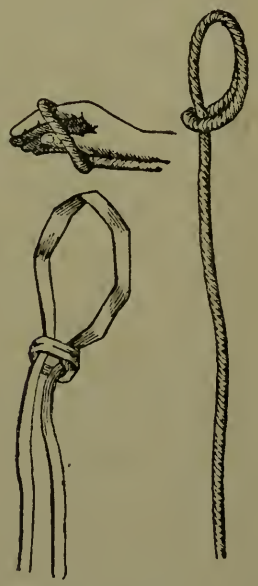

Fig. 42-A.
TRACTION CORD AND BAND.
THE MANNER OF APPLYING THEM.

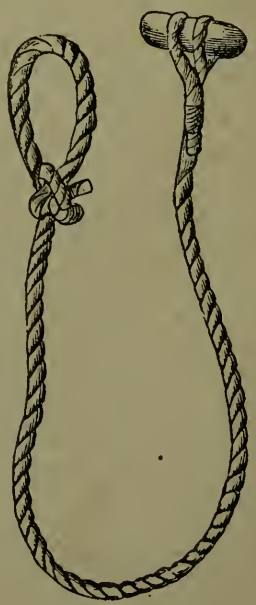

Fig. 42 B.
TRACTION CORD.

ing fluids and are strained. Whatever is used for this purpose should be very pliable, and yet sufficiently strong to withstand energetic pulling.

A very good traction cord is made as illustrated in Fig. 42-B. This is merely a cord with a running noose at

one end, and a small piece of round wood at the other, to give the assistant a better hold, and enable him to use more force. This is applied in the same manner as Fig. 42-A. Either mode, Fig. 42-A or B, will be found very simple and convenient to apply, especially to the limbs.

MANNER OF APPLYING, FIG. 42-A and B.—Gather the fingers together so as to form a kind of cone, on which the running noose of the cord is placed, as in Fig. 42-A. The noose is kept in its place on the fingers, in tightening the cord, by the free portion which passes along the under side of the hand and arm; unless this precaution is adopted, the noose will be pushed back over the hand when introduced into the vagina. The hand and cord being oiled, are introduced into the passage, and when the foot is reached it is seized in the fingers; these are then suddenly bent, so as to shorten the cone and cause the noose to run onto the pastern by a gentle pull of the cord, which can then be tightened and given to an assistant. The neck of the lower jaw is "corded" in a similar manner; the mouth of the foetus being opened, the noose is passed around the neck of the lower jaw, and the knot or loop placed beneath the chin.

Cords are very useful and can be applied to any portion of the body. When long cords are used, and energetic traction is likely to be employed, knots should be tied at intervals, to prevent the hands of the assistant slipping.

HEAD-COLLAR, HEAD-CORD, OR HALTER.

As before mentioned, the interdental space, or "neck" of the jaw is convenient for the attachment of the cord; but it will be found in practice, that if the noose does not slip off the jaw, which is often the case, should the traction be at all energetic, the bones will probably be smashed, the foetus, if alive, irreparably damaged. It is, therefore, very important that the head-collar be placed on the foetus

whenever it will accomplish the desired effect, in preference to the cording of the jaws.

The Head-collar illustrated in Fig. 43 is one of the best patterns, is simple and easily constructed, and can be adjusted to any sized head. It is made from a long piece of cord with a loop or eyelet at one end, and at a certain distance from this—from fourteen to sixteen inches—a second loop. The other end of the cord is passed through the first loop, so as to make a noose which goes round the neck

Fig. 43.

HEAD COLLAR.

of the foetus; then through the second loop which goes round the lower part of the head, and may be made large or small. The remaining portion is used for traction. This head-collar is held at its upper part by the index-finger and thumb, passed into the genital canal or womb, where it is placed on the head of the foetus and the sides applied to the cheeks; the lower portion, which was open, is now closed by running the end of the cord through the second loop,

by which the head is firmly secured, as in Fig. 43. (Also see Fig. 44, which is constructed with a metal runner.) It is now ready for traction.

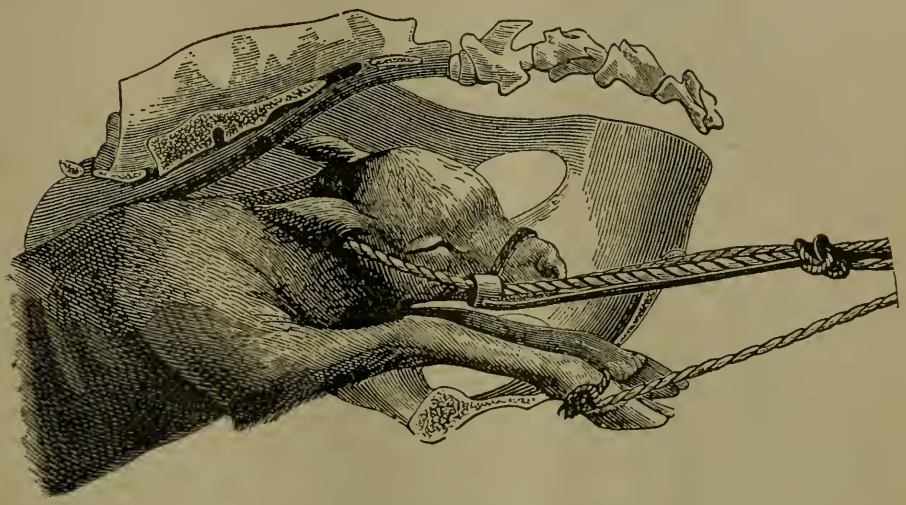

Fig. 44.

HEAD COLLAR PLACED ON CALF'S HEAD, THE RIGHT FORE-PASTERN BEING ALSO CORDED.

WIRE EXTRACTOR FOR THE SMALL ANIMALS.

With the Sow, Bitch, Cat, and sometimes the Ewe, cords cannot be passed around the head of the foetus, because of the want of space; and on the same grounds forceps are objectionable. With these animals it is essential that the traction force should be applied behind the head. Therefore the wire extractor will be a very useful apparatus for this purpose. It consists merely of two very pliable copper or brass wires—twisted picture-frame wire has been found to answer admirably—but remember any kind of wire must be thoroughly cleansed before used—about sixteen inches in length, and looped in the middle, so as to be applied to the foetus in the following manner: The first finger of the left hand being passed into the vagina, serves to guide one of the loops towards the summit of and behind

the foetal head; and it then conducts the loop of the other wire beneath the head behind the jaw. This done, the two wires on each side are twisted by a little machine (Fig. 45) composed of a thin rod in a handle, the other end of which is thickened and pierced by holes running nearly parallel to the stalk. Into these holes the two wires of one side are

Fig. 45.
WIRE-EXTRACTOR.

passed, then the two on the other side into the other machine; the machine on each side is pulled up as close as possible to the head of the foetus, and then, each being turned round three or four times, the neck is enclosed in a kind of noose or collar formed by the two wires (Fig. 46). The rods are now withdrawn from the wires and the foetus

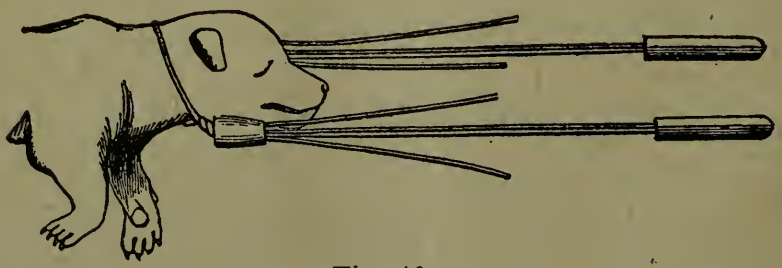

Fig. 46.
WIRE-EXTRACTOR APPLIED.

can be extracted by exercising traction (see Traction) on the ends of the four wires outside the vulva. By this contrivance, delivery is effected without injury to the mother, and, unless it is much decomposed, without separating the head of the foetus.

TUBE AND NOOSE.

A much simpler and readier apparatus, than the wire extractor, is the tube and noose. In some cases it can be successfully employed with Sows, Ewes, and Goats; but it is especially adapted to the small Bitch and Cat.

The tube consists of a tubular piece of round wood, from four to six inches long, and half an inch thick. The

Fig. 47.
TUBE AND NOOSE.

noose consists of catgut or wire, either of copper, brass, or iron (catgut is preferable), about sixteen inches long; this is doubled, passed through the tube to a certain extent, so as to form a loop or noose at the end (Fig. 47). When it is to be used, the first finger of the left hand carries the loop into the vagina of the mother, and slips it behind the head of the foetus; then the two ends of the wire are passed through the tube, and this is pushed into the vagina under

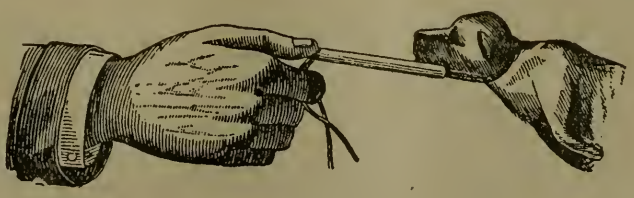

Fig. 48.
NOOSE FIXED ON THE FOETUS.

the chin of the foetus; the operator now tightens and secures the wire, by giving it a turn around the first finger of his right hand, placing his thumb at the end of the tube (Fig. 48). A little traction then extracts the foetus, and without doing it or the mother the least damage. Even the tiniest toy terriers have been extracted alive in this manner, when aid was given in time.

PORTE-CORD OR PASS.

The arm of the operator may not be sufficiently long to pass cords to the region where they might be most effectively fixed, or the contractions of the womb paralyze the hand of the operator. In such circumstances the porte-cord, or pass-cord is of great service. The instrument is of two shapes, straight and curved.

The Straight Porte-cord is usually a rod of three-eighth inch iron, furnished with a wooden handle at one end, and an

Fig. 49.

DARREAU'S REPELLER, ARMED WITH A RUNNING NOOSE.

eyelet or double opening at the other to receive the cord. It is used to pass the traction cord around the limbs, or the neck of the lower jaw. After fixing the traction cord to the part, the porte-cord may be removed. And if it is constructed as in Fig. 49, if not removed from the traction cord, it may also be most serviceable as a repeller in pushing the foetus forward in the womb. Two of these may be used at the same time, on two limbs.

The Curved Porte-cord has its uses in certain cases when the straight one cannot be serviceable—as in passing a cord round the head or bent neck, thighs, or loins.

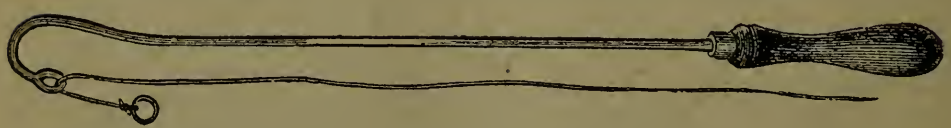

Fig. 50.

GUNTHER'S CURVED PORTE-CORD AND BLUNT CROCHET ARMED WITH A CORD AND RING.

The curved porte-cord (Fig. 50) is constructed from a rod of three-eighth inch iron. One end is curved and furnish- with an eyelet through which the traction cord is threaded. The other end is provided with a wooden handle. The trac-

tion cord to be introduced by the curved porte-cord, has only a loop or ring—no noose—at the end of it. The curved portion is pushed around the part of the foetus to be secured, and the hand, leaving it, is passed to the opposite side of the part, where it searches for the loop or ring, which, when found, is drawn into the genital canal. The porte-cord is then withdrawn, the traction cord remaining around the part; the free end of the cord is passed through the loop or ring, and being pulled at, the limb, neck, body, or whatever it may be, is secured in the noose so formed, and traction can be directly exerted upon it.

REPELLER, OR CRUTCH.

When it is necessary to repel or force the foetus farther into the womb, away from the inlet, it must not be forgotten that the hand and arm are the safest and most perfect of instruments, and should always be preferred—at least at first—to the repeller or crutch. For the hand feels the parts on which it is placed; it adapts itself more exactly to the surfaces with which it comes in contact; it perceives the resistance they offer, and warns the operator as to the amount of force necessary to effect a certain object; whereas the presence of a hard and rigid instrument increases the contractions of the womb, and however well applied it may be, it may suddenly glide off rounded and slippery surfaces and cause serious injury.

Nevertheless, there may be and often are, occasions when the hand cannot accomplish what is necessary in the way of retropulsion, and it is then that the repeller is most useful; an assistant can maintain the body of the foetus some distance from the pelvis by this instrument, while the hand of the operator is making the necessary rectifications; the operator is therefore much relieved, and to some extent he is also exempted from the difficulty and fatigue caused by the contractions of the womb.

The repeller or crutch is constructed of iron, and is

between two and three feet in length; it has a handle at one end, and a concave transverse piece, like the head of a crutch at the other. This piece may be either solid or jointed. The jointed repeller (Figs. 51 and 52) is preferable, as it can be closed, making it safer and easier to introduce into the vagina and womb. The crutch end being carefully carried by one hand through the genital canal, towards the

Fig. 51.
JOINT REPELLER CLOSED.

foetus, is applied to the most convenient part of the foetus; while the handle is seized in the other hand, and force can be effected either by this hand, the breast of the operator, or an assistant. (For Repeller armed with a traction cord, see Fig. 49.)

Retropulsion, or the forcing of the foetus away from the inlet or mouth of the womb, should only be effected in the intervals between straining "labour pains"; during these

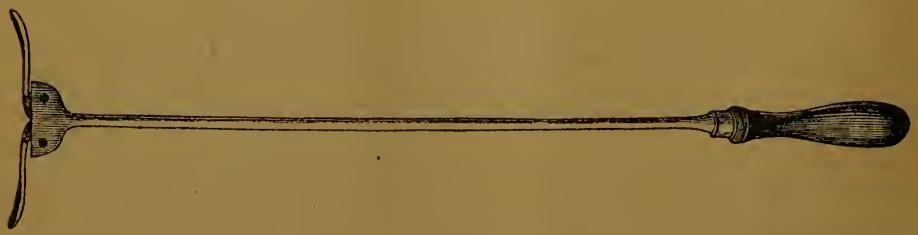

Fig. 52.
JOINT REPELLER OPEN.

"pains" the foetus should simply be held firmly in place, therefore resisting the expulsive efforts.

While the repeller is being employed, one hand of the operator must guide and maintain it against the foetus, to prevent it slipping and injuring the maternal organs. Before retropulsion it is nearly always necessary to secure some part of the foetus—head or limbs—by cords, so that it

may be readily seized again and brought into the pelvic cavity. Again the attention of the operator is called to the fact, that, retropulsion must be effected in the interval between the labour pains; while traction must be effected during the labour pains.

CROTCHETS OR HOOKS.

Crotchets or hooks are iron or steel instruments of variable dimensions, more or less curved at one end—which is

Fig. 53.
SHORT BLUNT CROCHET.

blunt, sharp, or pointed—the other end having a ring, or eyelet if short, a handle if long. The long crotchet (Figs. 50 and 55) is from thirty to thirty-six inches in length, and acts directly on the foetus without any other appliance intervening; while the short hooks (Figs. 53 and 54) have cords attached to them, or they may fit on the finger of the

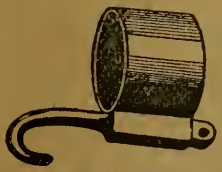

Fig. 54.
BLUNT FINGER CROTCHET.

operator by means of a ring (Fig. 54). When using the long or short sharp pointed crotchets, the hand must act as a guard or shield to prevent the sharp point injuring the maternal organs. If the hand is not found sufficient to guard the instrument during its introduction, it is advisable to fix the point in a piece of cork or soft wood, to which a long piece of twine is attached; when the crochet is requir-

ed to be implanted in the foetus, this shield may be removed from the point, and withdrawn from the genital organs by pulling at the end of the twine outside the vulva. The curve of the sharp crotchet should not be very wide; it should not be greater than the hand can cover, as it then can be held in a manner that will obviate injury to the operator as well as to the mother. The curve of the blunt crotchet should not be over four inches wide

The blunt crotchets are more particularly resorted to when the foetus is alive, and it is hoped to extract it before it is dead. The finger crotchet may be usefully employed when the hand is fatigued or paralyzed by the contractions of the womb. Blunt crotchets of a much smaller size than those required for the larger animals can be most successfully employed in delivering the Sow, Ewe, Goat, Bitch, or Cat.

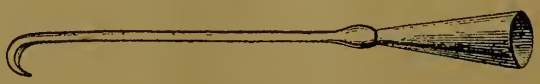

Fig. 55.

LONG POINTED CROCHET.

The crotchet affords a simple means of getting hold of the foetus in regions of its body which the hand cannot possibly reach, or if it did, where it could do very little service either from the shape of the part, its slipperiness, or the paralyzing effect of the contractions of the womb on the hand and arm of the operator. When it is necessary to implant this instrument into the muscular tissue, the sharp pointed crotchet is usually resorted to. When blunt crotchets are employed in this manner, except in cavities, it will be necessary to make an incision through the skin before they can be inserted. Crotchets may be implanted in the muscular tissues of the croup, thighs, loins, and neck, as the skin offers a good amount of resistance. But from the fragile and yielding nature of the textures, it must be borne in mind that the hand of the operator should never

leave the crotchet while traction is made on it, and that its position must be most attentively noted, in order to guard against accidents arising from its tearing away. For should the tissues suddenly give way and the crotchet slip into the maternal organs, serious, if not fatal, injuries may be inflicted; or the hand or arm of the operator may be the part to suffer. Therefore the necessity that the hand of the operator diligently guide the crotchet, and note its effects and movements; while, at the same time, he must vigilantly exercise his judgment in directing his assistants as to the amount and direction of the force they are to use, so as to proportion it according to the resistance of the tissues in which the crotchet is fixed, and to desist from traction as soon as there is a likelihood of the instrument breaking away or slipping.

The cavity of the eye affords a good point for implanting the blunt crotchet, especially if the foetus is dead, as does also the angle of the lower jaw, and the ear, on particular occasions. But in this, as when implanted into the muscular tissue, the crotchet must be carefully watched, avoiding the tearing of the tissues of these parts.

It is astonishing how quickly wounds will heal that have been effected in the live foetus by the implanting of the crotchet. When the foetus is dead, and especially if very much decayed, it is advisable to implant the crotchet at a point where it will become fixed beneath some of the bones, as this will prevent it from tearing out so easily.

FORCEPS.

The Forceps have not yielded much service to the veterinary obstetrist, except with the smaller animals. The Bitch forceps (Fig. 56) has in some cases proved serviceable with the Ewe, Goat, Sow, Bitch, and Cat. The forceps are held in position by one hand, while the other hand or a finger of the other hand (according to the size of the animal) introduces and guides the instrument, and allows the

part of the foetus to be seized to be reached by the operator, either with the view of extracting the young creature or changing its position, acording to indications. An essential which should not be lost sight of in the forceps for such small animals as the Bitch and Cat, is that the blades should be sufficiently long to seize not only the head, but much, if not all the body of the foetus. For as the neck of the foetus in these animals is almost as thick as its head, unless the blades of the forceps are sufficiently long to grasp a portion of its body, the head will slip from between the blades.

With the small animals the head of the foetus is only

Fig. 56.
BITCH FORCEPS.

a trifle less than the diameter of the pelvis. Therefore, it can be readily seen, that when the blades of the forceps are passed on the head of the foetus, the head and the forceps combined constitute a mass greater than the pelvic cavity will permit to pass through it; so that delivery becomes impossible. Especially is this the case with the small Bitch and Cat, and for this reason recourse to the forceps is seldom indicated; and if delivery is to be effected, a means must be substituted which presents less inconvenience. Therefore it is that the Wire Extractor (Figs. 45 and 46) or the Tube and Noose (Figs. 47 and 48) are to be preferred in nearly all cases.

TRACTION—THE EMPLOYMENT OF FORCE IN DIFFICULT PRTURITION.

An important question to be considered is the employment of force in the artificial extraction of the foetus. For, as has been shown, more or less energetic traction is very frequently needed to remove it from its parent; and those who are inexperienced in animal obstetrics, are sometimes astonished on hearing of the amount of pulling which the foetus has to undergo, and the parent sustain, before delivery can be effected in some cases. It is a subject well deserving the attention of the obstetrist, and especially the junior practitioner. The indications for traction have been given in the preceding subjects, and will not be alluded to again.

When traction is required, if the patient be a Mare or Cow, the operator should be supplied with from six to ten assistants: one to be placed at the head of the animal, another holding the rope which confines the limbs of the animal and prevents it doing damage, a third to hold the tail, a fourth to assist the operator, and the other two or six (according to the amount of traction to be employed) to pull at the foetus when necessary.

In the Mare and Cow, moderate traction consists of the combined strength of two or three strong men pulling steadily together with all their force. Energetic traction consists of the combined strength of from three to six strong men pulling in the same manner. Moderate traction usually is sufficient, if well managed. Energetic traction is always dangerous and should not be resorted to unless absolutely necessary.

The operator's assistants should be strong, and have had some experience in handling animals. Precautions should be adopted to prevent accidents—especially to the assistants—from the struggles or defensive movements of the animal; and when traction is employed, there is great

danger of dragging the animal backward and causing serious injury. Therefore, it is obvious that it is necessary to render the creature immovable by passing cords, bands, or a sack behind the thighs and above the hocks, bringing the ends against the animal's shoulders, and maintaining them there by attaching them to the manger or any other part sufficiently strong. A wooden bar placed behind the thighs and secured to the stall-posts, is also serviceable; as is likewise an ordinary harness breeching, the front parts being secured to rings in the wall or manger. When the operator gives the signal, the assistants should pull together without jerking, in a steady and energetic manner, in a straight line behind the animal. The direction of the traction may, however, be a little downward in the anterior presentation, until the withers have passed the inlet. The operator stands behind the mother, his hands on the sides of the vulva, which he depresses with the border of one hand, while with the back of it he separates the lips of the vulva and prevents their being abraded by the traction cord. It is better to engage only one shoulder of the foetus at a time, if possible; and when the breast and one shoulder have been carried into the passage, then the other shoulder is brought forward by directing the assitants to pull a trifle to the opposite side. By acting in this way with care, and by slow, though continued efforts while the parent is straining, delivery will be effected, if this be possible by traction. The operator must not act huriedly or bruesquely, and his hand should carefully attend the advance of the foetus; facilitating its passage, and aiding the progress of the haunches by passing his open hand between them and the maternal pelvis.

In the posterior presentation, when at least one assistant must be told off to each cord, the traction should be moderate, or even gentle at first, until the operator's hand has adjusted the foetus as much as possible. In addition, the operator, besides directing his assistants, must frequent-

ly himself guide the traction by the disengaged hand, and personally exert himself in the extraction of the young creature—separating the lips of the vulva, and pressing them towards the pelvis, when they are pushed outwards by the advancing foetus; lubricating the foetus and genital canal when necessary, with flaxseed tea, etc.

When powerful traction is required, great attention is necessary in guiding the foetus through the genital canal, so as to prevent injury to the parent. The traction should cease in the intervals between the labour pains, and the efforts ought not to be continuous; the animal should be allowed intervals of rest, and time be given the genital canal to dilate and adapt itself to the passage of the foetus. Severe and injudicious traction may be productive of the most serious results. Even when the operation is nearly terminated, care will be required in order to prevent inversion of the womb. This accident may be obviated by careful manipulation, and abundant injection of emollient fluids, as flaxseed tea, or linseed jelly.

When energetic traction is required, and it is impossible to obtain the proper amount of reliable assistants, hitching the Horse or Ox to the foetus has been resorted to, but this is barbarous and cruel and should never be practiced, as it is impossible to obtain the even traction which is desired (without jerks) with the power of the Horse or Ox; the young creature being simply torn through the maternal passage; therefore the obstetric machine (Fig. 57) will be of the greatest utility, and operators need not hesitate to employ it, as this machine has been tested and receives the highest praise. Not only can a greater tractile force be developed by it, but this force may be diminished or increased at will, and as gradually as circumstances may require, and without the jerks which are sometimes so troublesome and disastrous, when it is impossible to persuade five or six men to pull evenly together. The obstetrical machine presses against the hind-quarters of the par-

turient animal, and owing to its construction it cannot only develop a very energetic extractive force in the gentlest and most inoffensive way possible, but itself produces the counter-extention in an exactly proportionate degree.

The principal parts of the machine are: A kind of horse-collar (Fig. 57, A) with three stalks (B, C, D) intermediate between this collar, and a broad, fixed, female screw (E), which receives a movable screw rod (H), that bears a revolving hook and chain (K) at one end; the other

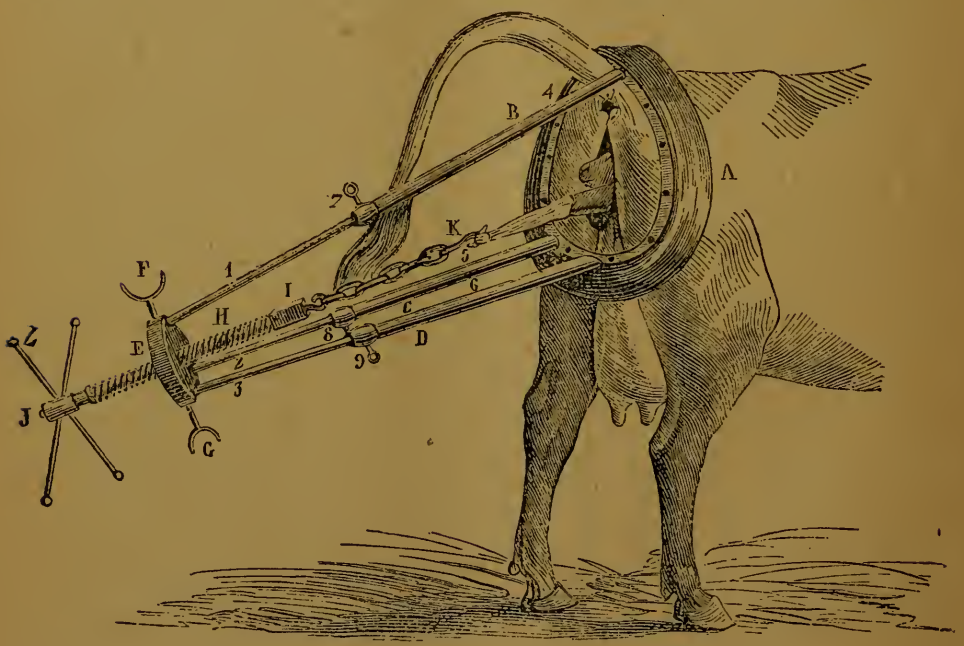

Fig. 57.
OBSTETRIC MACHINE.

end of the chain has also a hook to which the cord or cords fixed on the foetus are attached. The collar (A) is made of several pieces of light wood superposed, and bound together by an iron band applied to the opposite surface of that which is to be applied to the animal. This band is perforated by three screw holes placed in a triangular position, and which receive the iron stalks. The inner face of the collar is so fashioned as to fit closely on the hind parts of the animal, the space for the passage of the foetus being

about twenty inches in diameter. The intermediate stalks (B, C, D) serve to transmit to the collar the pressure exercised by the female screw; they are about forty inches long, and each is composed of two pieces, one of these being hollow (4, 5, 6), the other solid (1, 2, 3); consequently, one fits into the other, and the end opposite the collar enters one of the openings in the flange of the female screw (E); a small thumb-screw (7, 8, 9) secures the two portions of the stalk. The female screw (E) is of iron or copper, the flange being of wood, and its circumference provided with two handles to hold it firmly when the machine is in use. The male screw (H) is of iron, and screwed to the right; one extremity articulates with the turning-hook (I); it is screwed in the contrary direction to the principal portion, so as not to become unscrewed during the operation; the other end has a four-branched windlass (L), which can be removed at will.

To use the machine, the animal is made to lie; the cords are attached to the foetus in the usual manner; the windlass handle is put on its place; the screwed stalk (H) is introduced into the female screw to about as far as J; the collar is applied to the animal's croup, and the three long stalks are fixed—one end in the collar, the other in the flange of the female screw. An assistant keeps the machine in equilibrium by placing one of his hands on one of the forked handles (F, G) of the flange, while the other hand rests firmly on the ground. Another assitant, the cord attached to the foetus being fixed in the hook at the end of the chain (K), slowly turns the windlass in such a direction as will bring the extremity of the stalk (I) towards the flange, while the operator superintends the extraction in the same manner as when manual power is employed. Giving the same attention and observing the same precautions. If it is desired to slightly change the direction of traction, as is recommended in some of the presentations, it can be easily varied upwards, downwards, or to one side or the other,

by having an assistant press against the cord or cords, so as to give these the necessary direction.

With the Ewe, Goat, Sow, Bitch, and Cat, the operator himself applies the needed force, though an assistant is usually necessary to hold the creature. Generally, very little traction can be made because of the danger of tearing the foetus in pieces, and what is employed should be gentle and sustained; indeed, the foetus should be held steady, traction only made during the expulsive efforts of the mother, and then lightly and steadily.

EMBRYOTOMY.

EMBRYOTOMY, is the name given to every operation which has for its object the reduction in volume of the foetus at parturition, by mutilating or dividing it; so as to allow it to be extracted by portions when it cannot be delivered whole.

The fact that only one hand can be employed in the womb, that this organ is applied close to the foetus when the "waters" have escaped for some time, that the membranes are adhesive and cling to the fingers, and that the flaccid tissues of the young creature glide away from the cutting instrument—as they can only be rendered tense in certain circumstances by the cords or crotchets—and as the operation must be effected either in the genital canal or in the cavity of the womb, the manipulation of cutting instruments in such a confined space by one hand, under all the disadvantages of distance from the operator, the struggles and paralyzing straining of the mother, and without the aid of vision to guide and direct, renders the task peculiarly difficult and dangerous. It is sometimes difficult to distinguish what belongs to the foetus and what to the mother. Such cases should only be attempted by an experienced operator; the amateur should never attempt embryotomy unless he is sure of the part he is about to re-

move, as a mistake would undoubtedly prove fatal to the mother.

Embryotomy may be practiced on the head, limbs, or body; but the instruments which are recommended for performing this operation must be noticed first, as well as the preliminary arrangements.

EMBRYOTOMY INSTRUMENTS.

The straight embryotome (Fig. 58) and the curved embryotome (Fig. 59) are good and convenient instruments. The hole at the opposite end of the blade in Fig. 59 is ad-

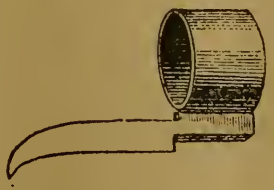

Fig. 58.
STRAIGHT EMBRYOTOME.

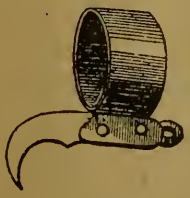

Fig. 59.
CURVED EMBRYOTOME.

vantageous; as a cord or tape can be passed through the hole and tied around the wrist, to prevent the knife slipping from the finger and falling into the cavity of the womb. Indeed, this is a wise precaution with all short instruments introduced into the genital organs, as the contractions of the womb, struggles of the animal, and the position of the hand, as well as the slipperiness caused by the presence of mucus, etc., often render the hold of the instrument very insecure. The middle finger of the operating hand is passed through the ring and the other fingers enclose the blade, which is

in this way safely conveyed to the part of the foetus which is to be incised. The finger knife is the most useful instrument in embryotomy.

After an incision has been made in the skin, the spatula is used to separate it from the textures beneath. Usually this can be accomplished with the fingers, but if the fingers become fatigued the spatula will be of much service.

The section of bones, though not frequently, is sometimes required; for this purpose chisels, and saws are employed. The sharp or cutting edges of these must be

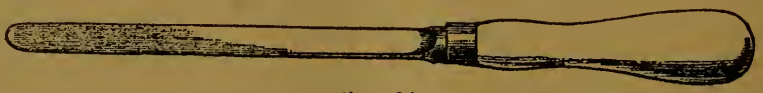

Fig. 60.
SPATULA.

Fig. 61.
BONE-CHISEL.

Fig. 62.
BONE SAW.

guarded or shielded by the hand when introducing them into the genital canal and womb.

PRELIMINARY ARRANGEMENTS FOR EMBRYOTOMY.

Being satisfied that nothing remains to be done to preserve the life of the parent but removing the foetus piecemeal, the operator has to decide, from the nature of the case, how this is to be affected; that is, under the circumstances, which part of the foetus is to be removed first.

The animal must be detached from the manger or rack, and kept, if possible, in a standing attiude; this posi-

tion being the one best suited for such an operation; or it may be tied by the head to a stake, by a rather long head-rope. A rug or blanket should be passed round the hind-quarters, a little above the hocks, the ends being held by assistants standing towards the shoulders of the animal. This precaution is required to steady the creature, to keep it in a standing position, and to assist it in resisting the traction generally employed in removing the foetus. It may be necessary if the animal is much exhausted, to administer several quarts of meal or flour gruel as a stimulant before commencing embryotomy. If the animal is suffering much pain, administer a dose of hydrate of chloral about ten or fifteen minutes before commencing the operation.

DOSE.—Hydrate of Chloral.—Mare and Cow, one ounce; Ewe and Sow, one drachm; Bitch and Cat, five grains. Dissolve in water and give as a drench.

PUNCTURE OF THE CRANIUM, OR SKULL.

It is sometimes necessary to puncture the cranium in order to allow the escape of fluids. Especially is this necessary when the head is enlarged from an excessive accumulation of water or fluid. The puncture may be made by the finger-knife, or even the finger in certain cases. The fluid having escaped, the thin fragile bones of the cranium readily collapse from the pressure they undergo in the pelvic cavity; so that the head and body can be removed by traction.

AMPUTATION OF THE HEAD. (DECAPITATION.)

Is an operation which consists in separating the head completely from the body, so as to allow these parts to be removed one after the other, is not very often required; and fortunately so, as it is not without great danger to the parent. More frequently the head is only partially removed.

When wedged in the genital passage, the head may

prove a troublesome obstacle to the performance of those maneuvers necessary for the reduction or adjustment of the other parts; as it may not be possible either to advance or repel it, nor yet to pass the hand between it and the pelvic walls to search for a deviated limb, for example, or to bring that limb into a proper position. The passage must, therefore, be freed from the obstacle, and this can be accomplished in the following manner: The fore-limbs, if present, are corded (Figs. 42, 44), and pushed as far towards the womb as possible; then the head is secured by cording the lower jaw, a pointed crotchet fixed into the cavity of each eye, or a head-collar (Figs. 43, 44) over the head if it can be placed. Four or five assistants now pull at the head by these appliances, so as to bring it as near the vulva as circumstances will permit; while another assistant keeps the lips of the vulva apart, in order to expose as much of the head as he can, and prevent injury to the organs of the parent. The operator, with a convenient knife (Fig. 59 is at this time very useful), incises the skin around the neck—first one side, then the other—close to the head, passes his fingers between the skin and the muscles beneath, and pushes the skin well back on the neck—the assistant pulling at the head at the same time, facilitates this separation. A few cuts now divides the soft tissues down to the spinal bone, and nothing more remains to be done than to produce disarticulation by vigorous traction and a twisting movement of the head at the same time; the ligaments gradually yield and tear, the head extends and at last comes away, and the body of the foetus recedes more or less suddenly. If the limbs have been previously secured with cords, they are brought into the passage by the cords attached to them; or if they are not so accessible, they must be sought for in the way already indicated under the different presentations, and delivery completed; it is very important that especial care be taken to cover the exposed bones of the

neck by the surplus skin, while the foetus is being brought through the passage.

It is always preferable, if possible, to remove one of the fore-limbs, as it is easier, quicker, and less dangerous. But decapitation must sometimes be performed, and then the above instructions will be found useful.

AMPUTATION OF THE LIMBS.

When the limbs are so deviated that they cannot be straightened, or when by their presence in the genital passage they prevent the necessary manoeuvres for the adjustment of other parts of the foetus, then it may be necessary to amputate or disarticulate one or more of the extremities.

AMPUTATION OF THE FORE-LIMBS.

In order to amputate a fore-limb, it must be more or less advanced in the vagina, or partially beyond the vulva. So that if it is still in the womb, it must be brought into the canal. If both limbs are to be removed, they must be secured by cords around the pastern in the ordinary manner (See Fig. 44), the cord of the one which is to be first amputated being pulled at by two, three, or four assistants, so as to draw it as near, or as much beyond, the vulva as possible. Another assistant then keeps the lips of the vulva wide apart, in order to allow the operator more room. A circular incision is made above the fetlock—or, better still, the knee, taking care not to go deeper than the skin. From this incision, gliding his hand into the vagina, along the outer side of the limb, the operator makes a longitudinal incision, extending higher up as the leg becomes elongated by the traction.

This longitudinal incision being made, the skin is separated from the muscles beneath, either by means of the fingers or the spatula (Fig. 60)—pushing the skin up towards the shoulder as it is detached, until at length, as the

leg becomes more stretched, the incision and the detached skin are as high as the shoulder. The dissection being then deemed sufficient, and the limb being only retained by the muscles which attach it to the chest, the operator, either by his hand or the crutch (Fig. 51, 52), makes pressure on the foetus, while the assistants are ordered to pull energetically at the cord on the pastern, and in a kind of jerking manner. Soon slight cracking sounds are heard, the muscles are rupturing and giving way, and in a very short time the entire limb—shoulder-blade and all—is removed.

The removal of one limb usually leaves a considerable space in the genital canal, and this allows delivery to be completed. Sometimes, however, and particularly when the head of the foetus is deviated towards the flank, it is necessary to remove the other limb; and this, when effected, permits the head to be sought for and rectified, etc., according to the requirements of the case.

With the Sheep and Goat, amputation of the fore-limbs of the foetus are very rarely required, though, if necessary, it can be effected. The same remark applies to the Bitch and Cat.

AMPUTATION OF THE HIND-LIMBS.

When the foetus makes a posterior presentation (Fig. 18), and a hind-limb appears at the vulva, it may be necessary to amputate this limb; or with the hind-limbs flexed at the hocks (Fig. 33), and so firmly wedged in the canal that they cannot be extended backwards, nor yet sufficiently bent to permit delivery—which frequently occurs in the Mare—these joints must be disarticulated.

When they are flexed at he hocks, amputation is accomplished by passing a running noose (Fig. 42-A, B) round each leg, above the hock, and tying it firmly there. Powerful traction (see Traction) made on one of the cords by four or five assistants, will bring the point of one of the hocks to the vulva, the lips of which are held apart by

an assistant, while the operator divides the back tendons and side ligaments of the joint, so as to produce complete disarticulation. The lower leg is then pushed into the vagina, the other limb is amputated in the same way, and birth is accomplished by pulling at both cords, which remain attached to the lower end of the leg bone.

When the limbs are completely retained in the posterior presentation (Fig. 35), a long incision is made through the skin and muscles behind the hip-joint; the hand removes all the muscles around the upper part of the thigh-bone, round which a cord is then fixed (Fig. 36) and pulled by two assistants, while the operator cuts through the attaching muscles and ligaments. In this way the joint is disarticulated, and a circular incision through the skin completes the task. as traction will remove the limb. It is to be remembered that it is always more difficult to amputate a hind-limb than a fore-limb.

DIVISION OF THE BODY OF THE FOETUS.—(DETRUNCATION.)

When one-half of the body of the foetus has more or less passed through the pelvic canal, and the other half is retained, so that it is impossible to extract or return it, it is recommended to cut the trunk in two.

If the hind-parts are retained, and the head and fore-limbs are not much beyond the vulva—if so far—cords should be placed on each pastern (Fig. 42, 44), and a head-stall (Fig. 43) on the head, and slow, gradual, but strong traction exerted on them, so as to expose as much of the body of the young creature as possible. This done, the operator, with a sharp embryotome (Fig. 58), incises the body in a circular manner as close to the vulva of the mother as is convenient (the lips of the vulva being kept well away by an assistant)—the incision commencing below, which allows the elongation of the spine; then the skin and muscles on the sides are divided. When the bones of the spine

are reached, the embryotome is passed between them, and as close to the loins as possible; slight pulling and twisting will then complete the division.

It is a good plan to incise the skin at some distance in front of the place where it is intended to divide the spine or any bone, and to separate and push it back over the portion of the trunk in the genital canal. When the division is effected, this superfluous skin is pulled over the remaining part and sewn together, so as to enclose the exposed bones completely, thus preventing injury to the parent. Then vigorous pressure is applied to the divided end of the spine of the remaining part, forcing it back within the womb. Now the operator can secure the hind-pasterns with cords, and delivery can be easily effected.

REDUCTION OF THE CHEST AND ABDOMEN.

If the obstacle to delivery is an enlarged chest or abdomen, these parts can be reduced by opening them and removing the internal organs or viscera.

ARTIFICIAL PREMATURE BIRTH.

This is, birth effected, when the foetus has attained such a stage of development as to be capable of living, but before the period of normal parturition has been reached. Such a procedure may be necessary when there is deformity of the maternal pelvis, or tumors thereon or therein, or when the mother is becoming exhausted from sustaining too many foetuses.

It is estimated that the foetus would be capable of living, and yet notably less in size and weight than when born at full term, if removed from the Mare 20 to 40 days before that period; from the Cow 15 to 30 days; and from the Bitch 10 to 15 days.

OPERATION.—The operator has merely to dilate the neck of the womb, which has already been described

in treating of sterility, and rigidity of spasm of the neck of the womb, also mechanical dilatation of the womb (which see); then the "water-bag" is extruded, the womb commences to contract, the animal also begins to strain, and the foetus is expelled. With the smaller animals the sponge tent, or a long probe is preferable for dilating the neck of the womb.

ATTENTION TO THE MOTHER AND OFF-SPRING AFTER DIFFICULT PARTURITION.

The mother and off-spring should receive the same attention after difficult parturition as they would after normal parturition (which see).

With regard to the young animal, it sometimes receives slight wounds which soon heal; but fractures of bones are more serious, and generally necessitate slaughter of the animal. If looking healthy, yet cannot get up or stand when lifted up, this is in all probability owing to the strain of the limbs, and passes off in the course of a few days. When apparently dead, though the heart is contracting rapidly and violently, place near the open door, and administer a small quantity of brandy, and respiration will soon be established. Sometimes there is much swelling of the head, especially of the tongue, which projects from the mouth, making respiration very difficult. Scarification of the tongue when in this condition, or leeches applied to it, with turpentine or mustard rubbed on the limbs, soon bring relief.

RETENTION OF THE FOETAL MEMBRANES OR ENVELOPS AFTER ABORTION, NORMAL, AND DIFFICULT PARTURITION—RETENTION OF THE AFTER-BIRTH.

The retention of the foetal envelops, or "after-birth," beyond a certain time after the expulsion of the foetus from the womb, must be looked upon as serious and requires attention.

When parturition has been normal, when the animal does not appear to suffer pain or inconvenience, when the "straining" is unfrequent and slight, the appetite good and the secretion of milk established, and particularly when, during a low or moderate temperature a portion of the membranes protrude beyond the vulva, then there is no great reason for interference until a week, or even more, has elapsed. But if, on the contrary, the external temperature is high, if the labour has been difficult, the genital organs irritated or abraded, and if fever, restlessness, and suffering are noted, with strong and frequent straining, especially if there are foul-smelling discharges from the vagina, then treatment is called for, no matter whether the time which has elapsed since delivery is long or short.

TREATMENT.—Manual Traction may be employed when a portion of the membranes are visible or hanging from the vulva. This is seized either by the hands, or by means of a towel, or whisp of hay or straw, and gently pulled at—particularly when the animal strains—twisting it at the same time, until the whole mass is removed from the cavity of the womb. This traction is not likely to be productive of much injury to the Mare, Sow, Bitch, or Cat, as the adhesion of the after-birth is not great, and is usually limited to a few points. With the Cow, Ewe, and Goat, however, it is not so, owing to the numerous and often strong attachments of the after-birth, and its fragile texture, which renders it easily torn if too much force be employed; if it does not give way, and the traction is energetic, then there is risk of irritating the womb, and producing partial or complete inversion of the horn of the womb, or even of the entire womb. Should the after-birth be torn in two by immoderate traction, this may lead to greater difficulty in removing what is left of it in the womb. For these reasons, some practitioners discountenance this mode of removing the after-birth; but there can be no doubt that if the traction is moderate and judicious, the mem-

branes not very adherent to the interior of the womb, and a good part of them beyond the mouth of womb, the operation is quite justifiable and will be successful. When, however, the resistance is marked, or the membranes begin to tear, it is better to desist, and resort to the same manipulation as recommended when the after-birth is completely retained.

COMPLETE RETENTION OF THE AFTER-BIRTH.—After the birth of the foetus, if nothing whatever is discernible externally, there is reason to surmise that the after-birth is completely retained. In this case it is advisable, in order to prevent imprisonment for some time, through the closure of the mouth of the womb, to introduce the hand into the womb, and if the after-birth is already partially detached, to extract it. If it remains firmly adherent, however, it is better to gather as much as can be seized into a single mass, carry it through the mouth of the womb into the vagina, and tying it there by a long piece of cord, to leave the latter hanging outside the vulva. This prevents the mouth of the womb closing, while the cord will assist in effecting artificial removal at a later period, should such be required. However, by giving the following recipe, manipulation will seldom be required:

Laurel Berries.....three and two-thirds drachms.
Aniseed.....one and two-thirds drachms.
Bicarbonate of Soda, three and two-thirds drachms.

Make an infusion by pouring two quarts of boiling water over these and stirring occasionally until cooled.

DOSE.—Mare and Cow, one-half of the infusion; Ewe and Sow, one-quarter; Bitch and Cat, one-sixth. Repeat the dose in six hours, also on the following day, if necessary; but, as a rule, the membranes are expelled within twenty-four hours after the last dose has been given. This infusion should always be given before resorting to manipulation and force, as it has rendered excellent service, succeeding in 60 per cent. of cases of retention, and is general-

ly administered in preference to the recipe that has already been alluded to in treatment of Sporadic Abortion. However, should the above remedy fail, then direct extraction will be necessary.

When direct extraction should take place will depend upon circumstances previously alluded to, as well as the species of animal. With the Mare—an animal peculiarly liable to septic infection—direct extraction of the after-birth is indicated within two or three hours after delivery, if it has not been expelled up to this time. The injection of warm water will materially facilitate the operation. With the Sow, Bitch, and Cat, it is preferable to await the result of the second dose of the foregoing recipe, before resorting to direct extraction of the after-birth. With the Cow, Ewe, and Goat, it will generally be found that direct extraction will not be successful before the third day, as in these animals the after-births are too closely and firmly attached to allow their disunion without injurious force, which may bring about inversion of the womb, or haemorrhage. About the third day (if in the meantime the infusion has failed) is generally a favorable period, as the neck of the womb is still sufficiently relaxed to pass the hand through the mouth of the womb, into the womb without difficulty.

During the operation of direct extraction of the after-birth, an assistant holds the tail of the animal to one side, while the well oiled hand and arm of the operator are passed into the vagina; if a portion of the membranes is in the canal, then the operation will not be so difficult, as the mouth of the womb will be more or less relaxed, while the membranes will serve as a guide for the hand. When, however, nothing of the envelops is to be found outside the mouth of the womb, and that opening is firmly closed—as happens four or six days after delivery—then it may be very difficult to reach the interior of the womb. To be enabled to accomplish this (see Mechanical Means for Dilating the Mouth of the Womb). When the hand reaches the

interior of the womb, it is pressed forward between the membrane lining the womb and the outer envelop (chorion) of the after-birth—the palm towards the after-birth—separating them as it advances. This is not so very difficult in the Mare, but with the Ewe, Cow, and Goat, the tediousness of the operation will be inferred when it is known that in these animals there are sometimes more than a hundred after-births (cotyledons) to be detached. (See Figs. 7, 8 and 9, and observe difference in formation.) The hand must pass from one to another, effecting disunion as rapidly, yet carefully, as possible. Some of these—the maternal after-births—may be detached from the membranes, while others are still imbedded in them, as it were, through their foetal after-births. These foetal after-births have to be enucleated; and to effect this, the after-birth is gently pressed at its base between the thumb and index finger, and, if necessary, the fingers are moved over each other, as if removing a button from its buttonhole. At times an after-birth will be met with which adhers so firmly that it cannot be detached in the way just mentioned. Then the nail of the thumb or other finger must be gently insinuated at the border, so as to gradually raise it, and pass the finger over the entire surface. The operator is oftentimes so greatly fatigued, that the right and left hand have to be employed alternately. When a certain number of after-births are detached, the portion of envelops so released is carried into the vagina and beyond the vulva, where the other hand, or an assistant, seizes and pulls gently on it. As the bulk of this increases by the detachment of more after-births, the pulling may cease, and the mass will require to be supported so as to prevent tearing the membranes, or painful dragging on the body of the womb. As the hand reaches the horn of the womb (Figs. 3 and 4) the after-births increase, and it becomes difficult to reach them, because of the insufficient length of the arm. Moderate traction, however, on the part just detached will bring the others nearer, and facil-

itate the task; but the traction must be judiciously managed, so as to avoid tearing the membranes. If there is any likelihood of the membranes tearing, tie them near the vulva and cut away the parts beyond, and be content to await their natural separation, generally occurring in from two to five days. After the removal, or direct extraction of the after-birth from any of the domesticated animals, wash out the interior of the womb with tepid water, and inject the following solution:

Warm Water .....one pint.
Carbolic Acid .....thirty drops.

Keeping the the animal in well-lighted and properly ventilated quarters, with a blanket over the body if the temperature is low; a raw linseed oil injection into the rectum, if constipation threatens; and a light laxative diet, with bran, oatmeal, or linseed gruel, are usually all that is necessary.

When the after-birth has putrefied in the womb, through delay in removing it, and an abundant and foul smelling discharge flows from the vulva, then the case is serious and requires instant attention. The womb must be cleared without delay from its contents, and in order to accomplish this the hand must be passed into the womb, and everything removed which it can possibly seize. Before doing this, however, the hand and arm should be well and frequently smeared with carbolized lard, to prevent septic infection in the operator; if there are wounds or abrasions on the hand or arm, the greatest care should be taken in this respect—indeed, it is questionable whether they should be introduced at all if the skin is not intact.

When everything has been taken away which the hand can remove, then the interior of the womb should be thoroughly cleansed by the continuous injection of tepid water from a large bulb syringe (if the tube of the syringe is not of sufficient length, fasten a rubber tube around the nozzle), until the fluid comes away perfectly clear. Then in-

ject a three per cent. solution of permanganate of potash. Should the discharge continue, this treatment should be repeated daily until it ceases; also give small doses of carbolic acid.

DOSE.—CARBOLIC ACID. — Mare and Cow, 15 grains; Ewe and Sow, 5 grains; Bitch, half grain. Dissolve and dilute in water and give as a drench twice daily as long as necessary.

The hands and arms of the operator should be thoroughly washed as soon as possible after the womb has been emptied; for this purpose nothing is better than carbolized soap. On the slightest sensation of uneasiness in the arm, advice should be taken in regard to it, as a breaking out of the skin from this cause is often a serious affair, and has necessitated the amputation of fingers, and even the greater portion of the arm.

FLOODING AFTER DELIVERY OR AFTER ABORTION. POST PARTUM HÆMORRHAGE.

The symptoms of haemorrhage after abortion or after delivery are, as a rule, not very well marked unless the blood passes away in fluid or clots, which is not always the case. The general symptoms are: The quick, weak, running-down pulse, which becomes imperceptible as death approaches, and the throbbing, irregular pulsations of the heart; rapidly increasing prostration of the animal, with the unsteady staggering gait on movement; haggard expression; with chilliness of the surface, cold clammy perspiration breaking out over the body; and, finally, the recumbent position, convulsions, and death.

TREATMENT.—If the after-birth has not been expelled, it must be removed without delay—yet as gently as possible (see Retention of the After-birth)—after which the womb will generally contract. If the after-birth has

been expelled, then with the hand clear the womb of the clots of blood, wash the interior of the womb with cold water injections, and, if necessary, introduce a large sponge or towel (to which has been tied a long cord, the end of which is to remain outside the vulva), saturated with vinegar-and-water, or a 15 percent. solution of perchloride of iron, into the vagina, or even into the womb, and allow to remain for two or three hours. Should the haemorrhage persist, apply mustard plasters to the chest, neck, and limbs and give internally the tincture of perchloride of iron.

DOSE.—TINCTURE PERCHLORIDE OF IRON. Mare and Cow, one and one-half ounces; Ewe and Sow, twenty drops; Bitch, ten drops; Cat, five drops. Dilute in water and give as a drench.

INVERSION—PROLAPSUS OF THE WOMB AFTER PARTURITION.

A displacement or kind of hernia of the womb, which is partially or completely turned inside out. When the inversion is partial, nothing whatever is seen externally, and an exploration alone reveals the existence of the accident; if more developed, the womb appears as a round tumor between the lips of the vulva when the animal is lying. When inversion is complete, the womb has the form of an enormous pear-shaped tumor hanging between the hind-limbs, and sometimes as low as the hocks. At the very commencement of this grave accident, the animal is uneasy and anxious-looking; it paws with the fore or stamps with the hind-feet; switches the tail as if driving off insects; lies down and gets up frequently, finding no ease in either attitude; and strains more or less energetically, thus adding to the extruded mass. At first there is no perceptible fever, and the animal may even eat. This state is not of long duration; for soon after inversion is complete, indications of fever becomes manifest—quickened pulse and respiration,

and an expression of pain. The straining becomes more frequent and energetic; the animal maintains the recumbent position and soon succumbs.

TREATMENT.—The animal is made to stand if this is possible, and the hind-quarters should be raised. If the accident is recent—of an hour or two—the womb may be returned at once; but should a longer interval have elapsed, it is well to empty the rectum and bladder if they are filled or distended. Should the foetal membranes still be adherent to the surface of the womb—wholly or partially—they must be carefully removed. Also torn or gangrenous portions of mucous membrane are to be removed with the knife or scissors. This done, the womb should be cleansed from matters adhering to its surface—such as litter, mud, dirt, filth, or blood—by placing it into a large vessel of cold water, to which has been added a tablespoonful of boric acid, allowing the organ to remain in it as long as ten minutes. This will also help to diminish its size.

When complete inversion has taken place, one assistant should be placed at the head of the animal, another at each side to steady it. The womb must be placed on a cloth or sheet in two or three folds and well moistened, the ends being held by two assistants at the croup, so that the organ may be lifted as high as the vulva. Should the animal strain very severely and continuously, it is useful to constrain the chest as much as possible by a girth. It may even be necessary to give a draught of chloral.

DOSE OF CHLORAL.—Mare and Cow, one ounce; Ewe and Sow, one drachm; Bitch and Cat, five grains.

Now, the best method undoubtedly is, to return first the parts of the organ nearest the vulva, and not act directly on the body of the womb until the greater portion has been replaced in the pelvis. To accomplish this, the operator gently presses with open hands at each side on the parts close to the vulvar opening, in order to force them gradually into it. By acting in this way with care and patience,

and preventing, as well as he can, the expulsion of those portions he has already reduced, the womb by degrees becomes diminished. After two-thirds or three-fourths of the total mass has been carried into the pelvic cavity; for it is then more expeditious, and quite as safe, to proceed in the same manner as if only partial inversion had occurred; that is, to apply the closed fist to the extremity of the womb, or tumor, as it is more properly called, and push it directly into the vagina and abdomen. In some instances it will be found that, towards the termination of reduction, the organ itself returns to its normal position, and often quite suddenly, as if it had been thrown forward by a spring. Sometimes it is most useful to have an assistant pressing on the extremity of the womb, while the operator manipulates near the vulva.

At all times great care is necessary in exerting the pressure, which should not be applied while the animal is straining. During expulsive efforts the operator must be content to wait, merely keeping the parts where he has carried them, until the straining has ceased. The pressure must be steady and well directed, so as not to bruise or lacerate the womb. When a portion is got within the vulva, it is held there by one hand, while the other manipulates the next part to be returned. At this time the pad or the cup-shaped pessary (Figs. 63, 64) will aid the operator; the round end is applied to the body of the womb, and pressure is made at the other end of the instrument by the chest or abdomen of the operator, whose hands are thus at liberty to direct the expelled parts into the vagina. When the womb has been returned to the abdominal cavity, should straining continue, it is then essential that the hand of the operator should explore the interior of the womb, as it sometimes happens that one of the horns remains turned in itself to a certain extent, causing renewed straining, and in all probability bring about reinversion. It is generally advisable to keep the hand in the womb for a short time until

the womb begins to contract freely; if this is not done, the organ may again be come inverted.

With the smaller animals, replacing the womb is rendered difficult because of the pelvis not admitting the hand; and with some of them, and particularly the Sow, replacing of the prolapsed horn of the womb is often a serious matter. The horn must be replaced in the manner already indicated, the finger, or even a tallow candle, being employed to adjust them; then the body of the womb should follow; a small pessary with a handle may be used to complete the operation. (See pessaries).

It should be observed that replacement of the womb has been effected in large and small animals by elevating the hind-quarters until they are almost vertical, the weight of the womb, with careful manipulation on the part of the operator, carrying it down to its normal situation.

MECHANICAL MEANS FOR THE RETENTION OF THE WOMB AFTER IT HAS BEEN REPLACED. —After the womb has been properly replaced in the abdominal cavity, it will be quite necessary to apply some means to retain it in position, thereby avoiding reinversion of the organ. This precaution must be observed, no matter how quickly the animal manifests improvement.

After slight or PARTIAL INVERSION of the WOMB, the pessary is usually all that will be required. Either of the following described pessaries will be very beneficial for this purpose. The dimensions given will be for the Mare and Cow; for the smaller animals they must be made in proportion to their size.

PAD PESSARY (Fig. 63) is a round piece of wood, from twenty to twenty-five inches in length, with a hole in one end, through which passes a loop of strong cord six to eight inches long; at the other end is a round pad, three or four inches in diameter, composed of tow or rags, covered by a piece of soft cloth or oiled silk, and firmly tied to the

stalk by a piece of twine fixed in a small circular grove therein. In using this pessary, the pad is placed in oil or melted lard until it becomes thoroughly saturated; it is then

Fig. 63.

PAD PESSARY.

carefully introduced into the vagina, placed against the neck of the womb, and cords from each side of the loop at the other end, attached to a surcingle round the chest, keep it firmly in its place.

RING PESSARY (Fig. 64) is composed of a wooden or iron ring, about two and one-half inches in diameter, and of a strong wooden stem about twenty inches in length, cleft in two as far as the middle, where it is tied by a piece of twine. The ends of the two branches are firmly tenoned in the mortises of the ring; and the other end of the stalk (B) is flat, and passes through the central opening of a transverse piece (T T), which is about eight inches long, and has at each end a small block (O O), to prevent the cords from slipping off. When required for use, the ring is wrapped in a narrow piece of fine linen, which is rolled round it in a uniform manner, so that it may not irritate the neck of the womb, with which it has to come in contact. This part is well oiled, and being passed through the vagina, is so placed against the womb that the neck of the womb will be in the middle of the ring. It is secured by means of cords or straps at the end of the transverse portion, in a similar manner to the pad pessary.

Fig. 64.
RING PESSARY.

CUP-AND-BALL PESSARY (Fig. 65) is composed of a round iron or steel ring (A A), about two and one-half inches in diameter; from this arise three stalks (B B B); these unite about six or seven inches from the ring into a single stalk (T T), which is screwed from a little beyond this union to the end. On this screwed portion moves a transverse piece (C C), by its middle opening or female screw (E); this piece has openings (G G) at its extremities in which are to be fastened straps or cords. To use it, the ring and the three branches are dipped in melted wax, then cooled, and again and again dipped and cooled, until the

instrument has acquired a sufficient volume, and the middle of the ring is reduced to about one and one-half inches. This prevents it injuring the genital organs, when it is to be applied exactly in the same maner as the preceding pessary—the neck of the womb being in the center of the ring.

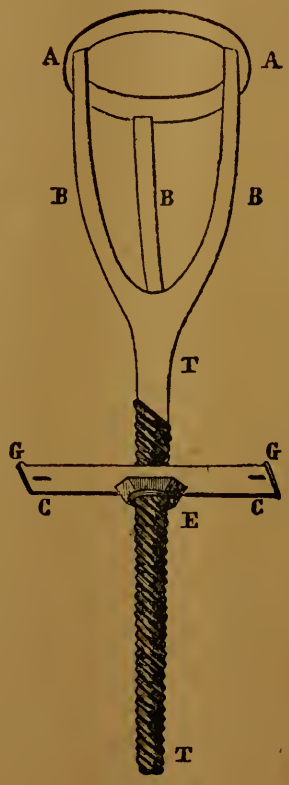

Fig. 65.

CUP-AND-BALL PESSARY.

After COMPLETE INVERSION of the WOMB the truss is to be adopted and is preferred to any other method for the retention of the womb in its normal position.

ROPE TRUSS.—The most useful and readily made trusses are composed of light rope or thick cord—something like a clothes-line, about thirty feet long, and a leather-strap which buckles around the neck. In order to apply the bandage, the neck-strap or collar is first to be put on; the cord is then to be doubled in equal parts and put across the

back, behind the withers, so that each portion may fall behind the shoulders, to be passed under the chest. In front of the chest, the two portions are crossed, the left passing to the right and the right to the left. Each side is carried

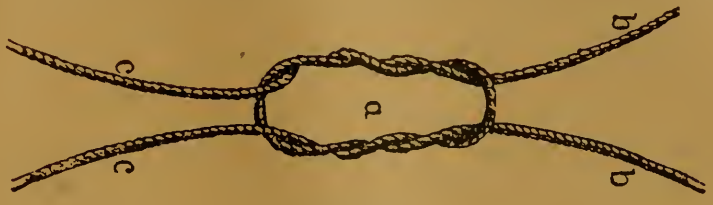

Fig. 66.

LOOP OF ROPE TRUSS WHICH EXTENDS AROUND THE VULVA.

through the collar, and back over the front of the shoulder, at the top of which both are tied in a simple knot, so as to be easily untied when required. At ten or twelve inches

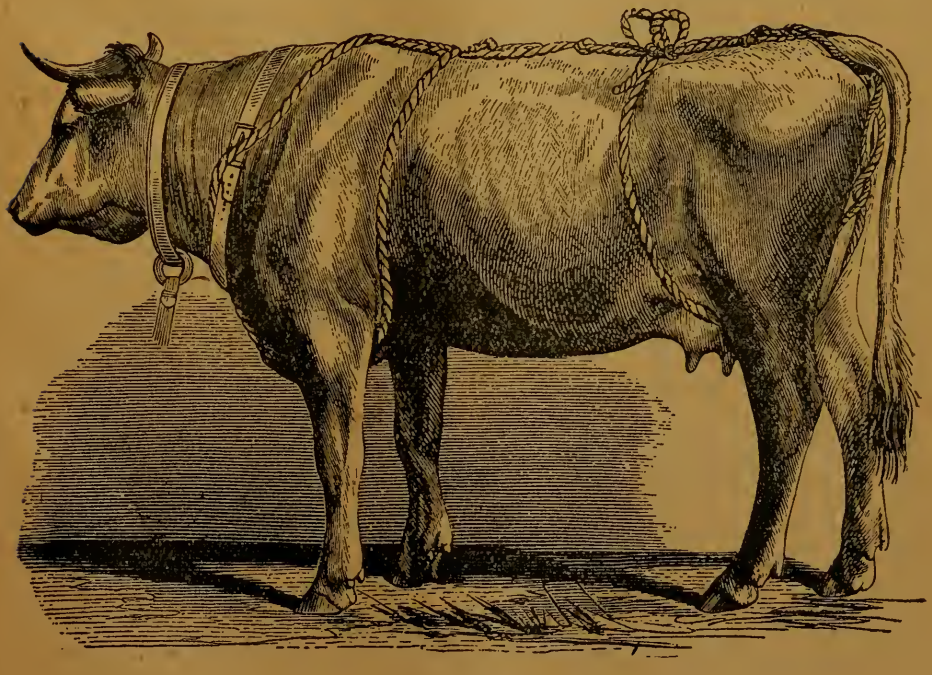

Fig. 67.

ROPE TRUSS APPLIED.

from this, a firmer knot is tied, then several others beyond it towards the loins—according to the length of the animal

—and at nearly equal distances as far as the root of the tail, where a simple knot is tied. The cords are then united by a loop in such a manner that an oval space (a, Fig. 66) sufficient to admit the vulva, and compress it laterally, is formed—the lower angle of the vulva being left free, to allow the escape of urine, and discharges from the womb, should there be any. The loop should be wrapped in tow or cloth, to prevent chafing to the parts under the tail. The cords are now carried between the hind-legs, brought up by the flank towards the loins on each side, and tied over the back to one of the loops there, as shown in Fig. 67. This truss can be made as easy or tight as necessary. The simplicity and usefulness of this truss are to be recommended.

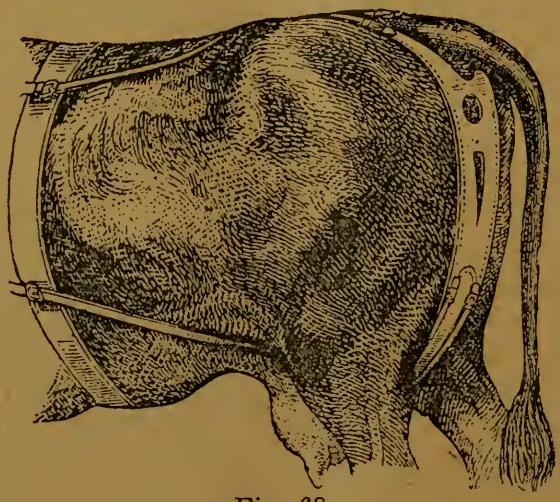

Fig. 68.

LEATHER TRUSS APPLIED.

LEATHER TRUSS.—A very efficient and useful truss is that made of a piece of stout leather, with a round opening in it above, corresponding with the anus, and an oblong opening beneath this, through which the vulva passes. The leather is so shaped as to embrace and lie close to the root of the tail and between the buttocks, extending for some distance below the vulva, as in Fig. 68. It is maintained in position by four long leather straps—two above and two below—which pass on each side to a surcingle

around the chest, which may again be attached to a collar or breast strap, should the straining be violent.

AFTER TREATMENT.—The animal should stand with the hind parts well raised, and it ought not to be allowed to lie down for a day or so. A weak solution of boric acid should be injected into the cavity of the womb once a day for two or three days. Great attention should be paid to the diet: For the first day, only oatmeal gruel with barley water—both tepid—should be allowed in small, but frequent quantities. For some days, easily-digested sloppy food should be given, though the quantity should not be large at any time until all danger is passed. Should there be a tendency to constipation, soap-and-water injections may be administered.

FALL OR INVERSION OF THE VAGINA AFTER PARTURITION.

Inversion, Prolapsus, or Fall of the Vagina, is a hernia of this part through the vulvar opening, analogous to inversion of the womb, and with which it may be complicated.

SYMPTOMS.—The chief symptoms of this accident is the presence of a tumor protruding from between the lips of the vulva, and which may hang for some distance below that opening. In this respect it resembles inversion of the womb, though the differences are otherwise very marked. In the majority of cases the tumor is most voluminous when the animal is lying, and can then be best examined. It is circular in outline, varies in size from that of an apple to the dimensions of a large melon, and is not unlike a sausage in shape; the surface is smooth.

TREATMENT.—The cleansing, replacing of the parts in the cavity, mechanical appliances, and care of the animal is the same as that for inversion of the womb (which see).

RUPTURE OF THE WOMB AFTER PARTURITION.

It is somewhat remarkable that laceration or rupture of the womb at this time is far from being serious.

TREATMENT.—Beyond the cleansing of the lacerated part with a three per cent. solution of permanganate of potassium, little more has to be observed. Some authorities have closed the rent by stitches; but very many have not, and the termination has been as favorable in the one series of cases as the other. Unless the rupture is on the lower wall of the womb, stitches are at least superfluous.

RUPTURE OF THE VAGINA.

THE SYMPTOMS of injury to the vagina and neighboring organs will vary with their nature and extent. Much constitutional disturbance is generally only manifested when the rupture is serious, or when poisonous infection has taken place. Then acute fever, infiltration, and other grave symptoms may supervene.

TREATMENT.—When rupture of the vagina is recognized during parturition, delivery should be effected as speedily as possible, and with every care, in order to prevent the laceration extending and the foetus or some part of the foetus, passing into it, which undoubtedly would result in injury to the adjoining organs. The foetal membranes should also be extracted as soon as possible. If there is haemorrhage or bleeding from the vagina, this may be suppressed by injections of cold water; should this fail to stop the bleeding, then a sponge or a cloth soaked in cold water, to which has been added a small portion of perchloride of iron, should be placed in the canal. Should there be hernia of the bladder or intestines, these must be replaced at once.

In all cases of wounds, abrasions, or rupture of the vagina, every precaution should be observed with a view to the prevention of poisonous infection. With this object the

greatest cleanliness must be observed, all decomposing matters, or those likely to decompose, should, if possible, be scrupulously removed, and injections or "swabbings" of a three per cent. solution of permanganate of potassium should be administered. A solution of carbolic acid (20 drops of the acid to one pint of water) will be as serviceable.

RUPTURE OF THE PERINÆUM.

This accident is usually caused by malposition of the foetus. The laceration sometimes extends from the upper angle of the vulva to the anus, in which case the poor animal often presents a painful and repulsive spectacle; the dung and flatus escape involuntarily.

TREATMENT.—If the bleeding is slight, cold water may check it; but if severe, the water must have perchloride of iron added to it. The lacerated margins, if much torn, must be freed from shreds which are likely to lose, or have already lost their vitality. They must then be brought together by stitches—either of metal, carbolized silk, or catgut. Cold-water dressings may then be applied; or carbolized glycerine may be employed. The parts must be kept as clean as possible, and the animal not disturbed or allowed to lie down until union has been effected. With this object a narrow stall is to be preferred. Raw linseed oil should be injected into the rectum twice daily to keep the dung soft. Sloppy food should be given as diet.

INFLAMMATION OF THE VAGINA.

When this inflammation takes place after parturition it is generally due to protracted and laborious delivery. In very exceptional instances, it may be due to the action of cold on the skin, or drinking of very cold water. It may lead to, or be complicated with, ulceration, gangrene, or mortification to a greater or less extent.

SYMPTOMS.—The lips of the vulva and the lining membrane of the vagina are more or less swollen, the latter being of a bright-red, brown, or livid hue; urination is generally painful and difficult, constipation is often present, and there is sometimes much itching in the region of the vulva, which is indicated by the continued attempts the animal makes to rub that part. When the inflammation has existed for one or two days, the mucus secreted by the membranes is greatly increased in quantity; it is at first a limpid fluid, sometimes streaked with blood; then it gradually becomes thicker and purulent, soiling the tail, thighs, and hocks, sometimes causing removal of the hair and irritating the skin of those parts.

TREATMENT.—Cleanliness, attention to diet, and injections of cold or tepid water into the vagina, generally succeed in subduing the inflammation; if the injections induce straining they should only be administered in small quantity. When, however, there is any tendency to ulceration, or even abrasions, carbolic acid should be added to the injection in the proportion of 20 drops of the acid to a pint of water.

WHITES (LEUCORRHOEA.)

Leucorrhoea is chronic inflammation of the vagina. When this disease is present there is a loss of condition and appetite. There is a white, glutinous discharge, which may be odorless or it may be very foul-smelling. Fecundation does not take place so readily, and if it does occur, the chances are that the full period of pregnancy will not be reached.

TREATMENT.—The treatment will consist of injections, the same as recommended in Inflammation of the Vagina (which see). In addition to this it will be necessary to tone the condition of the animal with good food, to which has been added the following tonic:

Milk of Sulphur .....two ounces.
Nitrate of Potassium .....two ounces.
Foenugreek .....two ounces.
Armenian Bole .....one ounce.
Powdered Aniseed .....one ounce.
Gentian .....half ounce.
Ginger .....half ounce.

Mix thoroughly, and give once daily mixed in the food the following dose: Mare and Cow, one ounce; Sheep and Sow, two drachms; Bitch, half drachm.

If the discharge continues after two or three weeks' treatment, it may be found useful to apply a blister to the loins, croup, or thighs.

INFLAMMATION OF THE WOMB (Metritis), AND PARTURIENT FEVER.

Inflammation of the womb, with, or without blood-poisoning (parturient septicaemia), may ensue very soon after delivery—rarely before the second day with the Cow and Ewe, and seldom beyond the eighth day. With the Mare, Bitch, Goat, Sow, and Cat it may appear later.

SYMPTOMS.—Immediately after parturition the animal may appear to have quite recovered from the effects of that act. When simple inflammation of the womb commences to take place, the vulva becomes swollen, with heat and redness of the vagina, fever, straining, difficulty in urination, diminution or suppression of the milk secretion, poor appetite and dullness. With, and sometimes without, treatment, this condition passes off in a few days.

Should the inflammation increase, which it frequently does, and especially if the womb has received any wounds, the same symptoms are observable, but more marked. The animal grinds its teeth, and betrays the existence of colicky pains by lying down and getting up, stamping, striking at the belly and turning the head towards the flanks, and mak-

ing more or less energetic expulsive efforts. Signs of pain or lameness in the hind-limbs become apparent. When the womb is more inflamed the larger animals do not lie down, because of the increased pain produced by pressure on the abdomen, only lying down as death approaches, or when the hind-quarters become paralyzed. The smaller animals, however, maintain the recumbent position. At first, the discharge from the vagina is thin; then it becomes gradually thicker and more abundant. Examination of the vagina discovers it to be very hot and sensitive, particularly towards the neck of the womb. A very marked symptom is swelling of the vulva, the lips of which are separated.

This is a serious disease and frequently terminates in death in from two to six days. Therefore, it should receive immediate attention as soon as it makes its appearance.

TREATMENT.—First, remove from the womb and vagina any putrid matters they may contain; then the genital canal should be thoroughly cleansed by injections of warm water (80° to 100° Fahr.), and the wounds dressed with the following solution:

Salycilic Acid .....one ounce.
Spirits of Wine .....one pint.
Warm Water .....one and one-half pints.

Mix and apply to the wounds by means of a very soft brush or feather.

After the interior of the womb has been cleansed by injections of warm water, an injection into the vagina of two quarts of warm water to which has been added three drachms of carbolic acid should be administered every day, and the wounds, if accessible, dressed at the same time with the above solution of salycilic acid.

The external treatment must be hot fomentations and mustard plasters to the surface of the abdomen. The smaller animals may have linseed-meal poultices applied.

Salycilic acid must be administered internally to neu-

tralize the action of the poisonous matters in the blood and tissues.

DOSE.—Salycilic Acid. Mare and Cow, 2 drachms; Ewe, 1 drachm; sow, one-half drachm; Bitch and Cat, 5 grains. To be given in water every four hours. The food should be of a laxative and sloppy nature.

The bowels must be kept free by the administration of raw linseed oil, either internally or by injection, or both if necessary. When recovery is taking place, good food and a good tonic must be allowed. (For tonic see Leucorrhoea, or Whites.)

No person who has ben handling a creature suffering from inflammation of the womb or any decomposing animal matter, should be allowed to assist animals in parturition; and the same rule ought to be observed with regard to instruments and obstetrical appliances, unless they have been thoroughly cleansed. When a case of this inflammation occurs where there are other pregnant animals, or animals which have quite recently brought forth, these should be immediately removed.

MILK FEVER (PARTURIENT APOPLEXY.)

This disease is seen in all breeds of cattle and generally attacks Cows which give large quantities of rich milk. It is seldom seen during the first, second, or third calving period, but usually from that time on, and almost always in cows that are highly fed and in good flesh. It usually occurs within three days after calving, and is very fatal—fully one-half of those attacked die. If recovery does result great care should be taken at the next time of calving, as a recurrence of the attack at that time frequently and generally proves fatal.

SYMPTOMS.—Usually between the first and third day after calving, the Cow will stand around, dull and stupid; appetite, rumination, and milk will be suspended—

or only a slight flow of milk present; the Cow walks as if weak across the back, staggers around shaking her head; as the disease advances she falls to the ground, unable to rise again. She may rest in a recumbent position with her head carried around to her side, or she may lie stretched out upon her side, with her head lying upon the ground. Sometimes the head is shaken viciously from side to side, endangering those about her and being liable to break off her horns. Occasionally, but not often, a few kicks with the feet are given. The eyes become glassy and staring, soon growing insensible to the touch, with total blindness. Sometimes the eye-lids will quiver and jerk for some time. The pulse, at first full and soft, later on becomes slower and feebler, gradually becoming almost imperceptible. The breathing, at first almost normal, becomes generally slower, prolonged and difficult; and frequently a rattling sound is heard within the wind-pipe. At the commencement of the attack, the temperature will range from 103 to 104 degrees Fahr., and as the disease progresses will gradually sink to 3 or 4 degrees below normal. At first the bowels may appear loose, but soon become constipated, and the urine is usually retained within the bladder.

TREATMENT.—It is the desire to impress upon the reader's mind that to be successful in the treatment of parturient apoplexy demands persistent attendance until death actually occurs. There have been cases, where the owner considered treatment useless and momentarily looked for death, make complete recovery. If the patient is seen when the pulse is still full and strong, bleed to the amount of six quarts; but if the pulse is weak and the animal down, with the eyes insensible to light, do not bleed. As soon as possible give the following physic:

Epsom Salt .....twenty ounces.
Calomel ..... one drachm.
Croton Oil .....twenty drops.
Warm Beer .....one-half gallon.
Mix.

If the animal has become unconscious, give very slowly, as it is liable to run down the wind-pipe. Then draw away the urine by means of a catheter, or by slipping the finger, well oiled, into the neck of the bladder, the urine will frequently be passed. Give injections of warm water every hour. Constantly apply cloths wrung out of hot water over the loins and apply ice-cold water or ice bags to the head, as the brain is badly congested. Frequently draw away the milk and keep the body and limbs warm, by friction and blankets; keep the animal in a position as nearly erect as possible, and give the proper amount of the following recipe every two hours until recovery begins, when the time should be lengthened:

Aromatic Spirits of Ammonia.....eight ounces.
Spirits Nitrous Ether.....four ounces.
Tincture Nux Vomica .....two ounces.
Tincture Gentian .....six ounces.
Mix.

Give four ounces in a quart of warm beer or water, or a half pint of hot whisky every two hours. This may seem like heavy dosing with stimulants, but it is the proper thing to do. Should the physic operate and the animal begin to appear conscious of her surroundings, feed on soft and sloppy diet, until convalescence has been established. Prevention is the best and safest treatment for parturient apoplexy. When the animal is known to be a heavy milker and is fleshy or plethoric in condition, she should be fed previous to calving, on a laxative diet—as linseed cake, bran mash, etc.—and but sparingly. The milk should be drawn away for ten days previous to calving; immediately after calving give the following drench:

Epsom Salt .....twelve ounces.
Glauber's Salt .....six ounces.
Ginger .....one-half ounce.
Foenugreek .....one-half ounce.
Water .....one-half gallon.
Mix.

If the above directions are followed parturient apoplexy will be prevented.

INFLAMMATION OF THE UDDER.

The animal does not at first appear to be much affected, and the swollen gland or glands are evidently not very painful. The skin is tense and shining, though perhaps not reddened; the teat is greatly enlarged, hard, and sometimes somewhat sensitive to manipulation. The deeper tissue of the gland is found to be somewhat harder, and towards the teat rather lumpy. With careful and frequent milking, and attention to the diet and hygiene, complete recovery may take place in three or four days. If neglected, however, or mismanaged in treatment, the inflammation may become more serious and attack the milk vesicles. Then the secretion of milk is greatly diminished in the gland, and what is withdrawn, contains mucus, pus, and clots. If this catarrhal condition is permitted to continue, milk abscesses form within the udder; death may result from the absorption of this poison into the blood or from gangrene.

TREATMENT.—However slight the attack or mild the form of inflammation of the udder may be, in view of the serious consequences which it may entail, treatment should be prompt and judicious; as in two or three days alterations may be produced in the secretory apparatus of the gland which medical skill may be unable to amend.

When the udder or quarter is simply engorged with milk, nothing more has to be done than to thoroughly remove this fluid. This, of course, cannot be accomplished

at once, and it may be necessary to milk the animal several times during the day—five or six times. When this causes pain, the milking should be performed gently; and if pressure on the teat causes so much disturbance that the milk cannot be withdrawn by hand, then the teat syphon (Fig. 69), will oiled, should be passed into the milk-duct (see Fig. 2); should it be necessary to retain it there, this can be effected by a cord or tape being passed through the rings and tied over the animal's loins. In all cases in which hand milking causes pain, and is likely to increase the evil it is intended to avert, the teat syphon should be resorted to.

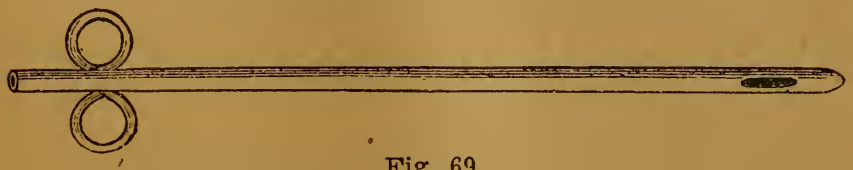

Fig. 69.

RING TEAT-SYPHON.

The progeny should only be allowed access to the healthy quarters of the udder. Applications of Vinegar to the udder is highly recommended to allay the pain. When the pain has diminished, it is generally advisable to allow the progeny to withdraw the milk. The animal should not be exposed to cold or draughts.

If lumps or coagula be detected, they must be removed, by moving the lumps up and down, when possible, by careful and gentle pressure. When they can be easily displaced, they may then be pushed down to the end of the teat, and pressed through. A lump as large as a nut has been extracted from the Cow in this manner. Should the lump prove to be too large to remove in this way, it may be necessary to introduce a sound carefully into the canal, in order to break it up. When the mass is very large and dense it may be necessary to incise the teat before it can be removed. Nothing can equal the success of the following lotion to prevent the formation of these lumps in the udder. This lotion has obtained more success than any other, and

should be applied to the udder as soon as there are any indications of inflammation of that organ. Although it will be very beneficial if applied any time before the inflammation has attained its greatest intensity:

Potash .....one ounce.
Water .....two ounces.
Olive Oil .....five ounces.

These are to be well mixed, and then four or five ounces more water are to be added. Often, after five or six hours, during which nothing could be drawn from the teat except a small quantity of thin, curdled milk, there is obtained a whitish-yellow fluid, more like pus than milk, which is a favorable sign. Should abscesses form they must be opened in the usual manner. Retention of the milk is sometimes due to obliteration of the milk canal (which see).

As a preventive measure when infection, is apprehended—as in retention of the after-birth, etc.—it is advisable to inject a two and one-half per cent. solution of carbolic acid up the teat by means of a glass syringe, always after milking; the solution should be at a temperature of 95 degrees Fahr.

ABSENCE OF MILK. (AGALACTIA.)

Absence of milk is mose frequently met with in the Mare and Cow. In some instances the milk gradually appears some time after parturition, but in the majority of cases it is either not produced at all, or only in very small quantity. This condition is very unfortunate for the progeny, which will suffer from hunger if not observed, and must be either artificially reared, or put to another animal to be suckled.

CAUSES.—This may be due to some chronic disease of the udder; but it is generally the result of exhaustion following disease; severe labour; insufficient food, either

during or immediately after pregnancy; natural debility, emaciation, etc.

TREATMENT.—The treatment of this condition frequently proves unsuccessful. It must chiefly consist in giving good food to which has been added the proper quantity of the following recipe:

Powdered Gentian .....one pound.
Powdered Aniseed .....one pound.
Mix thoroughly.

DOSE.—Mare and Cow, two ounces; Ewe and Sow, two drachms; Bitch and Cat, ten grains. Give in the food three times a day, or mix with water and give as a drench. It is well to remember that aniseed or fennel-seed is a great stimulant to the secretory functions of the udder.

The teats should be frequently stripped and the udder rubbed with brandy. In a serious case in which the udder was rubbed with brandy, friction applied to the abdomen, and warm milk and fennel-seeds administered internally, in two days the milk began to appear.

DOSE.—Fennel-seeds.—Mare and Cow, one and one-half ounces; Ewe and Sow, two drachms; Bitch, fifteen grains; Cat, ten grains.

CRACKS OR FISSURES IN THE TEATS.

These should not be neglected, however slight they may appear to be.

TREATMENT.—There is nothing better than cleanliness and the application of carbolized glycerine (1 to 20) for this trouble. The progeny must not be allowed access to the teat until it is thoroughly healed.

OBLITERATION OF THE MILK DUCT.

If the udder becomes distended immediately before or after parturition, but no milk issues from the teat or teats, it is an indication of obliteration or obstruction of the milk canal.

TREATMENT.—If the obstruction is due merely to the formation of skin over the opening, a small incision should be made in two directions in the skin where the opening should be, with a sharp pointed knife or lancet. To prevent the wound closing, a small bougie is introduced into the canal for four or five days until the wound has healed; it should only be taken out at milking-time. If the obstruction is immediately within the opening, a fine trocar or stocking-needle, previously cleaned in boiling water and dipped in carbolic acid solution, must be passed into it and through the obstruction, when the milk will flow. If the canal is only partly obstructed, and particularly if a wart is the cause of the obstruction, Fig. 70 will be very beneficial in removing the obstruction. This sound is an iron wire, having a ring at one end, and at the other a steel cone

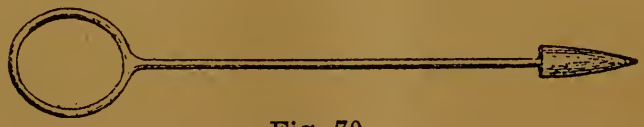

Fig. 70.

PERFORATING SOUND.

Half the Natural Size.

screwed onto it. This cone has a very sharp point, and both sides have cutting edges at the base or widest part. It is passed into the opening of the teat, pushed through the obstacle, and then gently turned round from side to side until no resistance is felt. Then it is withdrawn, and the bougie or teat-syphon (Fig. 69), or a piece of catgut, introduced.

In all cutting operations on the teat, every precaution must be adopted for the prevention of inflammation; and this chiefly consists in cleasing all instruments in a solution of carbolic acid before using them.

Diseases and Abnormalities of the Young Animal.

SUFFOCATION (ASPHYXIA) OF THE NEW-BORN ANIMAL.

(See Suspended Animation.)

BLEEDING FROM THE NAVEL. (UMBILICAL HAEMORRHAGE.)

When the bleeding is trifling and not likely to continue long, little, if anything, requires to be done; but when it is copious and continuous, active and prompt treatment must be adopted.

TREATMENT.—If the cord is extremely short, alum, tannic acid, or the perchloride of iron should be applied to the navel. Should these fail the actual cautery must be aplied. If, however, the cord is sufficiently long, it is better to tie it with a ligature; this will check the bleeding, and the cord will slough away in four or five days. In applying the ligature, the operator must be careful not to include a portion of the intestine within it, and by squeezing the cord with the fingers, as much serum should be got rid of as possible. Artificial respiration is required when there is suspended animation (which see), and this alone often causes the haemorrhage to cease.

FLOW OF URINE FROM THE NAVEL—PERSISTENCE OF THE URACHUS.

The Urachus is a canal which passes through the umbilical or navel ring, and during foetal life communicates with the bladder, from which it conveys the urine into the allantoid sac (Fig. 7. Also read Navel Cord). After birth this canal is obliterated, its walls become a thin cord, and the bladder is retracted within the pelvic cavity, the urine then passing through the urethra.

TREATMENT.—In some cases scarcely any treatment is neecssary, the escape of urine ceasing in a few days after birth; and when treatment is demanded, a cure can generally be effected in a short time.

When the urachus protrudes sufficiently from the umbilical ring, a ligature may be fastened securely around it. If it is too short to be tied by a ligature, it must be secured by a curved needle. The animal is thrown on its left side, and the operator, holding the threaded needle in his right hand, seizes the urachus—which is covered by the skin—between the thumb and index-finger of the left hand, and pulls it outwards; the needle is then passed through behind the canal, including as little of the skin as possible, and the ends tied. However, before adopting remedial measures, it is best to ascertain if the urethra is open. If it is not, an opening must be made before the urachus is closed or death will result in a few days from retention of the urine.

In those cases in which the urachus cannot be secured by the needle, aplications of sulphate of copper may be successfully employed. In very obstinate cases the actual cautery must be employed.

NAVEL (UMBILICAL) HERNIA.

SYMPTOMS.—There is a round tumor situated in the region of the navel, varying in size in different individuals and species—from that of a pigeon's egg to a child's head,

or even larger. The size also varies in the same individual at different times, according as the digestive organs are full or empty, the attitude standing or recumbent, or the duration of the hernia—the older it is the larger the tumor. It is usually soft, fluctuating, easily depressed by the finger, and as readily resuming its ordinary size and shape; at first, however, it is often tense and not depressible. Sometimes is has a doughy feel and fluctuates much, and at other times it is flaccid, according as the portion of intestines which it contains is empty or filled. On applying the open hand against the tumor, the worm-like movements of the intestines can be ascertained.

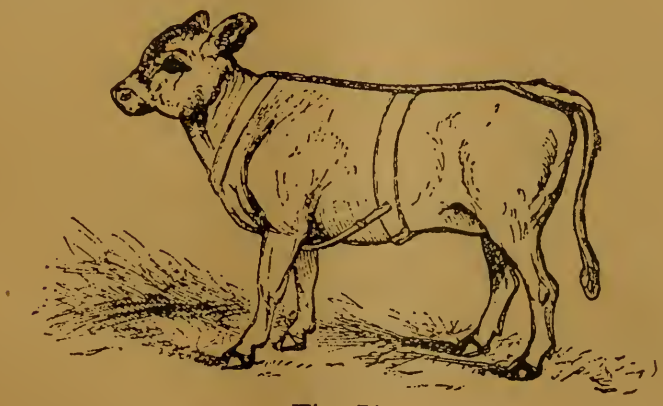

Fig. 71.

TRUSS APPLIED FOR NAVEL (UMBILICAL) HERNIA.

TREATMENT.—Hernia in young animals often disappears spontaneously. Especially, does this frequently occur, soon after the young animal has been weaned, and its diet changed from milk to other food. This is due to the natural changes which take place in the digestive apparatus at this time.

If the hernia is rapidly increasing or becoming troublesome in any way whatever, it is not advisable to wait until weaning time, as by that time the hernia might prove to be very serious. Therefore it is always advisable, in a case of hernia, to apply a truss before complications are manifest. Fig. 71 is an exceedingly useful truss, and is easily con-

structed and applied. It is constructed of two girths—one of which is of canvas webbing, and passes around the chest; the other, of India-rubber webbing, goes around the belly—at which point it is wider—and maintains a pad against the navel. This pad is a wide, but not very thick, cushion, stuffed with horsehair. The girth passing around the belly is kept in position by the longitudinal bands passing from it to the chest girth. Another strap passes from around the tail over the back, through the belly girth, to the chest girth, where it is attached. The straps and girths should be arranged with buckle fastenings so as to allow of their being shortened or lengthened to fit the animal.

Before the truss is applied, it is necessary to place the animal on its back, and with the fingers carefully reduce the

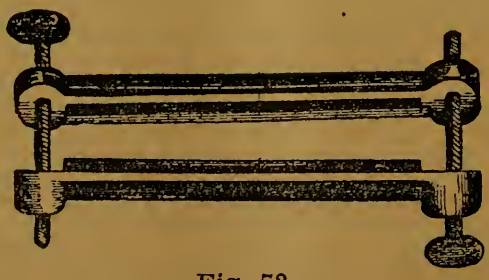

Fig. 72.

NAVEL (UMBILICAL) CLAM.

hernia. When it has all been forced back within the abdominal cavity, place the pad exactly over the navel and adjust the balance of the truss as previously directed. The truss should be drawn rather tight, and allowed to remain on the animal for about three months.

When hernia has not received the proper treatment in due time, it frequently becomes very serious. In these cases the truss somtimes fails to effect a cure, and the clam must be resorted to. The iron screw clam (Fig. 72) is generally recommended as being the most useful. One branch has a long, deep groove, and into this fits a narrow projecting ridge on the opposite branch. To apply the clam the animal is placed on its back. The skin over the rupture is

drawn together by the fingers in a flat fold, corresponding with the central longitudinal line through the abdomen (linea alba), and elevated from the parts beneath. The clam is then put over the skin, as close to the abdomen as possible, and the screws at the end of the clam tightened. The pressure must not be too severe, or the parts will drop off too soon, and possibly the intestines may escape. The operation, therefore, requires to be carefully watched.

When the hernia cannot be reduced, or if strangulation has taken place, then it will be necessary to carefully open the sac. Should adhesion have taken place between the sac and the intestines, this must be broken up; if the navel ring has to be incised in order to return the membranes, this may be effected by a blunt pointed knife. The incision should be no longer than is absolutely requisite.

With regard to the diet: Easily digested food, in small quantity and frequently, should be given until the cure is effected.

DROPSICAL SWELLING AROUND THE NAVEL. (ŒDEMA OF THE UMBILICUS.)

This is usually produced by laceration of the part during birth, though it may also be caused by one young creature sucking and pulling at the remains of the navel cord of another. It may also be due to chronic inflammation of this part.

The accident is readily recognized; the swelling is often very considerable, and always cold to the touch. It often persists a long time in calves, and constitutes a grave defect in young bulls, which it mechanically prevents from copulating.

TREATMENT.—Cold applications and compresses have been recommended in the way of treatment, as well as lotions of arnica, camphorated spirits of wine, preparations of iodine, mercury, etc. These often fail, however, and it

is generally better to resort to scarifications or leeches at once, to be succeeded by hot fomentations. When the swelling is chronic and due to a blood clot, open it and remove the clot of blood.

INFLAMMATION OF THE NAVEL (UMBILICAL) CORD (OMPHALITIS.)

INFLAMMATION OF THE NAVEL (the so-called "navel-ill" of shepherds), is a serious accident, and often terminates fatally. It consists essentially in inflammation of the umbilical vein, which sooner or later involves the adjoining tissues, and is often followed by suppuration and purulent infection (pyaemia), which causes the death of the young creature.

SYMPTOMS.—The inflammation commences soon after birth. The remains of the navel cord, in the normal condition, quickly dries up and withers, in a few days after the young animal is born. When inflamed, however, the part appears to be moist, and projects from the abdomen as an enlarged, compact, and hard mass, from the center of which flows a small quantity of thin, unhealthy, purulent-looking fluid that soils the surrounding skin. The peculiar tap-like appearance of the navel cord, its denisty and high temperature, with the discharge therefrom, will lead the careful observer to recognize the existence of inflammation of the navel cord.

A probe can be readily passed into the umbilical vein, which remains open to a considerable extent. The local symptoms are often overlooked at the commencement, and the first general signs of inflammation of the navel cord observed are usually dullness, arched back, indifferent to the teat and to surrounding objects, persistently lying down, fever, and hurried panting respiration when general infection takes place, and coagulation of blood in the lungs is occurring. As the malady progresses, great prostration is

manifest; there is swelling at the navel, and intense pain on manipulation of that region; the eyes are dull and red, the mouth very hot and dry; the pulse is so small and quick as to be scarcely perceptible; the bowels may be constipated and the dung scanty, or obstinate diarrhoea may supervene; the urine is greatly diminished in quantity; the mucous membranes frequently assume a yellowish tint; soft, fluctuating swellings, containing a yellow gelatinous fluid, often appear on various parts of the body; the creature refuses to suck; indications of colic or inflammation of the bowels are sometimes manifested. After this occurence, in the majority of cases, death rapidly ensues.

Not infrequently the inflamation of the inner membrane of the vein is most intense near the navel opening, and the pus, instead of freely escaping, accumulates in the canal to such a degree as to form a large swelling at the navel ring, which might be mistaken at the first glance for a hernia. When this swelling has been opened, about half a pint of pus escapes in some instances.

When a fatal termination does not quickly follow after the serious symptoms are manifested, we may have chronic morbid conditions of a purulent character set up, which are characterized by inflammation of the serous membranes in various parts of the body, and particularly of the joints. Indeed, it is now recognized by the highest Continental veterinarians, that the destructive arthritis, or "joint disease" of Foals, Calves, and Lambs is attributable to internal inflammation of the navel cord. Inflammation of the joints—especially of the hocks—has often been produced by the inflammation excited through ligaturing the navel cord.

CAUSES.—The causes are numerous, and may be enumerated as follows: The admission of air or foreign matters to the interior of the navel vessels; bruises or injury to the navel, either during birth or afterwards; irritation of this part, either by the litter, manure, or urine; the habit which certain females have of licking the navel of their

progeny, or of young creatures to suck the remains of the navel cord of each other; rupture of the cord close to, or within the abdomen; improper food given to the mother; exposure to cold and wet; over-crowding—it has been observed that, sometimes, of ten to fifteen young animals born within a few days of each other and kept together, half the number have become affected with inflammation of the navel

Another principal cause is infection. The discharge from one diseased navel may afford sufficient material to infect a great many newly-born animals. Not only may contamination take place through actual contact with objects soiled or impregnated by such infective material—as the secretions from the diseased navel of some young animal, the secretions or expelled membranes of an animal that has aborted, or a putrid after-birth which has been retained after parturition—but the air itself, or flies, may prove a medium for its conveyance to the navel.

When the remains of the navel cord are once fairly dried and shriveled, inflammation is very seldom, if ever, witnessed.

TREATMENT.—PREVENTIVE TREATMENT is most important in this malady. Therefore it is well to observe the following precautions: Cleanliness is absolutely necessary, and the young creature should be protected from every possible source of poisonous (septic) infection. The danger will be greatly obviated if the extremity of the navel cord is dressed immediately after birth with a concentrated solution of carbolic acid, which destroys germs, keeps away flies, and renders putrid matter innocuous, while it quickly shrivels up the cord itself. It all cases caution must be observed in applying the acid; it is to be applied to the extremity of the naval cord only; and not to the parts surrounding the navel. This preventive treatment is strongly to be recommended at all times, but particularly so when abortion has recently occurred among some of the animals.

CURATIVE TREATMENT.—At the commencement it should be chiefly local, and the application most likely to prove beneficial is a 5 per cent. solution of carbolic acid. If the fever runs high, a 5 per cent. solution of sal icylic acid is preferable. These to be applied twice or thrice daily for the first few days. If the umbilical vein is readily accessible, by placing the animal on its back, either of the above lotions may be introduced into it (the distance of nearly ten inches in the Foal or Calf; other animals according to the proportionate length of this vessel.); with a fine probe wrapped round with lint. The syringe used by some practitioners is not generally approved of, because of the danger of injuring the portal vein.

When the inflammation is very intense, tartarized antimony ointment should be applied. The ointment is prepared as the following:

Tartar Emetic .....one-half ounce.

Lard .....six ounces.

Mix thoroughly and apply sufficient quantity.

When there is danger of general infection, or this has already occurred, then the internal administration of the salicylate of soda must be resorted to.

DOSE—SALICYLATE OF SODA.—Foal and Calf, 15 grains Troy; Lamb, 7 grains; Pig, 4 grains; Puppy and Kitten, one-half grain. Dissolve in water and give every hour.

Constipation may be averted by castor-oil or a suitable diet—skimmed milk alternately with new milk; hot water fomentations ought to be applied to the abdomen, and the animal should be kept in a clean, cool place. After the occurrence of this inflammation, the quarters occupied by the young animal should be thoroughly disinfected in the same manner as recommended in Enzootic Abortion (which see).

ARTHRITIS—JOINT DISEASE—JOINT ILL.

Disease of the joints of young animals, occurring soon after birth, has been for a long time recorded in districts where breeding is largely carried on. In some years it prevails very extensively, and appears to be almost enzootic.

CAUSES.—Some practitioners persist in their belief that joint disease is due to the insufficiency of certain ingredients in the mother's milk. But Bollinger's observations have been generally accepted. He insists, that the lameness or disease of the joints which attacks the young animal during the first week after birth, are due to inflammation of the navel and navel vessels (which see). Bollinger lays great stress on the neglect of the naval cord in newly-born animals, and compares this neglect with the scrupulous attention paid to that of infants, which is severed and bandaged immediately after birth; while the young animals have to lie in all kinds of filth, and are thus readily exposed to inoculation with poisonous or injurious matters, which cannot be excluded even from stables built especially for the purpose, and kept thoroughly clean. If the navel cord of an infant were exposed to the filth which young animals have to lie in, it would be quite as liable to blood-poisoning as animals, and to the consequent affection of the joints.

Bollinger contests the influence of food in the production of this diseases, as strong, as well as weak, animals are attacked; it also appears when every kind of diet is given to the parent.

SYMPTOMS.—The principal symptom of this form of joint disease, is the extreme difficulty in moving. The movements are painfully and reluctantly performed, so that the young creature generally persists in lying. Around and near the joints there are hot and painful swellings. From the very commencement the symptoms are most acute, and similar to those of ordinary arthritis in older

animals; and they are rendered more marked by the least movement, the lameness being then extremely great; generally all the joints are involved. The fever is extreme, the respiration hurried, and the visible lining membranes highly injected with blood; sometimes, and especially with Lambs, the thirst is intense, and the suffering creature will often be observed dragging itself along the ground to reach water or the teat of its mother. Frequently there is diarrhoea or dysentery, and sometimes a purulent discharge from the nose.

The progress of this disease varies. It sometimes is very rapid, death occuring in twenty-four or forty-eight hours, while in other instances the animal may live twenty or thirty days, or even longer. Recovery is rare, and death is usually the temination. The malady usually ends in suppuration, which nearly always becomes general, numerous abscesses forming around the joints, which contains pus; there are also purulent deposits in other regions of the body. Generally after the fourth day, when the joints are greatly swollen, the hair falls off these parts, and a yellowish or citron-colored fluid, then pus, begins to exude through the skin, which sloughs away; the ligaments are also involved in this sloughing process, and at last, in some cases, the limb is only retained by remains of tendons, the bones being exposed, and the odor almost insupportable.

TREATMENT.—As it may be considered that this disease is always caused by inflammation of the navel, the PREVENTIVE TREATMENT will, therefore, be the same as for that disease. (See Inflammation of the Navel.)

CURATIVE TREATMENT.—The treatment, under the most favorable circumstances, is very unsatisfactory unless it is adopted at the very commencement. This treatment should be the same as that for inflammation of the navel (which see). Before the suppuration period, the tincture of iodine applied to the inflamed joints is beneficial. When suppuration is established, the abscess should be

opened as soon as it is soft to the touch. If much pain is evinced, give small doses of Dover's powder.

DOSE.—Dover's Powder.—Calf and Foal, 20 grains; Lamb, 5 grains.

The following lotion applied to the inflamed parts will also allay the pain.

Fluid Extract of Aconite.....40 parts.
Chloroform Liniment.....60 parts.

Apply externally over the seat of pain. Care must be exercised to prevent undue absorption and poisoning.

The salicylate of soda should be given the same as in inflammation of the navel. In addition to this, administer cod-liver-oil three times a day in the following doses:

DOSE.—Cod-liver-oil.—Foal and Calf, 2 drachms; Lamb, one-half drachm.

It is to be remembered that the mortality of this disease is as high as 90 per cent., and even when the life of the creature affected with joint disease is preserved, only too frequently its health and condition are irretrievably impaired. It is also well to remember, that joint disease is of the same nature as that which leads to abortion, and is capable of producing that accident. Therefore, owing to the above reasons, it is advisable when a young animal is born with joint disease, to destroy it and burn the body, or cover with lime and bury deep. If, however, the young animal is suffered to live, it should be separated from pregnant animals before the swellings suppurate or become sores. The stables and sheds in which this disease has been present should be disinfected the same as recommended in Enzootic Abortion (which see).

INDIGESTION IN YOUNG ANIMALS.

This is most frequently observed in Calves, especially high-bred Calves. The principal cause would appear to be too rich milk, or even milk difficult of digestion from its

poorness, or it may be due to the allowance of an over-quantity of milk.

SYMPTOMS.—The young animal looks dull and dejected, and evinces uneasiness or suffering; the movements are torpid; the coat dry and staring; it yawns now and again, and there are sharp gaseous eructations which cause it to elevate its head. Soon it refuses to suck or partake of its food; there may be vomiting of coagulated milk; the breath has an acid odor, and the tongue is coated with a white or greyish fur; the abdomen is swollen, and pressure made towards the upper part of the right side causes pain; and at this period symptoms of colic are often noted. Constipation or diarrhoea may be present. If diarrhoea is not persistent, it is a better indication than when constipation exists. Indigestion runs its course rapidly in the young animal—in the majority of cases only occupying two, three, or four days. It may be considered a serious condition, as death often occurs.

TREATMENT.—PREVENTIVE TREATMENT.—Over-repletion with milk should be guarded against, and if the animal is being reared artificially, great care must be paid to its diet. If at the teat, the food and water of the mother should be attended to, and if the milk is too rich, this may be remedied by giving less stimulating food to the mother. With Mares which are worked during the sucking period, the milk is often retained for a long time in the udder, and becomes altered; the Foal is ravenously hungry, and when given the opportunity over-gorges itself with the unhealthy fluid. The preventive measures are obvious in such a case.

The indigestion may be due to an insufficiency of oily matters in the milk of the mother; here the diet of the mother must be altered.

CURATIVE TREATMENT.—In mild cases, a spoonful of rennet is all that will be required to effect a speedy cure.

When the indigestion is due to acidity of the stomach, administer baking soda (bicarbonate of soda) in the following dose:

DOSE.—Baking Soda.—Foal and Calf, one-half drachm; Lamb and Pig, 4 grains; Puppy and Kitten, 1 grain.

The Soda is to be followed with a mild purgative—such as castor oil—even when diarrhoea has set in. If constipation persists, an injection of soap and water will be beneficial.

Much success has attended the administration, to the Calf and Foal, of a spoonful of finely-powdered vegetable charcoal, given twice a day, mixed with water, in which an egg has been beaten up.

DIARRHŒA—DYSENTERY IN YOUNG ANIMALS. (DYSENTERIA NEONATORUM.)

Epizootic abortion and this fatal malady have been noted to co-exist, and it has been supposed there is some relationship between the two maladies. It generally appears within a few days after birth—from the first to the third; beyond the fourth day it is much less frequent. In some instances the young creatures are affected before they have sucked; so that the milk could not have had any influence in its production, which is evidence of its infectious nature.

SYMPTOMS.—This disease usually appears within three days after birth. The animals are dull and restless, and the bowel movements consist or mucus, or fluid with an extremely bad odor. (With the Calf the fluid expelled is usually white, and very often streaked with blood.) The eyes become sunk in their orbits; the breath has a foetid odor; great debility and convulsions set in. Thirst is in-

tense; exhaustion is rapid and the creature cannot rise. Toward the end the creature lies immovable, and dies without a struggle in from one to three days; though in some cases death may ensue in a few hours.

With allusion to its fatality, it may be said, that from 50 to 100 per cent. die from this destructive disease. Especially is this the percentage with the Calf, and in many outbreaks it kills all the Calves in an establishment; if any chance to survive an attack, they are sickly and feeble for a long time.

TREATMENT.—As with every other animal malady, PREVENTIVE TREATMENT is the most important with regard to this dysentery of young animals. Attention to hygiene is very necessary at all times, and more so when the disease has shown itself in a stable or shed. It is much the safer plan, however, to remove all pregnant animals from the dwelling in which it has appeared, and the longer the interval which elapses between their removal and the occurrence of parturition, so the more likelihood there is of their progeny escaping. If moved in three to six weeks before parturition, their safety may be fairly assured. The stable or shed in which the malady has occurred should be well disinfected, the same as after Enzootic Abortion (which see), and, if possible, left unoccupied during the grazing season.

CURATIVE TREATMENT.—This disease has generally been considered incurable. But if the medical treatment is commenced with a slight laxative—such as castor-oil—to be followed by the following recipe (which may be considered almost a specific) many animals may be saved. if the treatment has not been delayed too long:

Pulverized Rhubarb Root.....one-half drachm.
Carbonate of Magnesium .....fifteen grains.
Pulverized Opium .....fifteen grains.

This is to be given to the Foal or Calf in one ounce of whisky—the dose to be repeated in one hour, and again

repeated in twelve hours if necessary. To the Lamb give one-third and to the Pig one-sixth of the above dose, and repeat in the same manner. Also inject into the rectum from three to six drachms (according to the size of the animal) of tepid water, to which has been added one grain of permanganate of potassium to each drachm of water.

If the animal can take food it should be given in small quantities, and each meal of milk is to be diluted with about one-fourth of lime-water, to prevent the formation of curd in the stomach. In more serious cases, milk should be withheld, and instead of it may be substituted well-boiled gruel made with wheaten flour, or even eggs and beef-tea may be administered. The patient should be kept warm and comfortable; warm baths have sometimes proved useful.

CONSTIPATION—RETENTION OF MECONIUM.

The contents of the intestines—the meconium—are generally expelled immediately after birth, when the navel (umbilical) circulation is first interrupted. When the meconium is retained much longer it is abnormal; and this, perhaps, occurs more frequently with the Foal than other creatures.

The prolonged retention of the meconium gives rise to constipation, and this is often a serious condition. The animals in which it occurs are generally weakly, and not well developed.

CAUSES.—Retention of the meconium is usually observed in animals which are born in February or March, and whose dams have been fed exclusively on dry fodder during the winter; as this renders the milk deficient in those purgative qualities which are so necessary for the new-born animal.

SYMPTOMS.—One or two days after birth the young animal appears to be uneasy, refuses to suck, has spasms, makes efforts to expel dung, exhibits symptoms of colic,

rolls on the ground, and often looks towards the abdomen; the back is arched, urination is suspended, pulse and respiration are frequent, the eyes are injected with blood, and there is grinding of the teeth. Inflammation of the bowels sets in, and death takes place in struggles and convulsions.

TREATMENT.—THE PREVENTIVE TREATMENT consists in attending to the feeding and condition of the pregnant animal some time before parturition. The young creature should be fed on the first milk its parent yields; if this cannot be given, then the animal should have a dose of castor-oil.

DOSE—CASTOR-OIL.—Foal and Calf, one ounce; Lamb and Pig, one drachm; Puppy and Kitten, twenty drops.

THE CURATIVE TREATMENT must be directed towards removing the meconium from the intestines. This may be effected by a soap or oil injection, or previously removing as much as is acessible to a well-oiled finger. That which is beyond reach of the finger can be brought away by means of a flexible, but not too weak, noose of wire (Fig. 47). The mother should have an abundance of fluid to drink, to which should be added the following dose of sulphate of soda:

DOSE.—Sulphate of Soda (Glauber's Salt).—Cow, one pound; Mare, three ounces; Sheep and Pig, two ounces.

If the constipation persists in the young animal, administer castor-oil. If there is much pain, give the following dose of chlorodyne in a little water:

DOSE.—Chlorodyne.—Foal and Calf, fifteen drops; Lamb, eight drops; Pig, five drops; Puppy and Kitten, two drops.

The above treatment will be equally beneficial whenever constipation manifests itself in the young animal up to the time of weaning.

ECLAMPSIA IN YOUNG ANIMALS.

This nervous affection has been observed in the Calf, Pig, and Dog within a variable period after birth.

SYMPTOMS.—The animal appears dull and unsteady on its limbs, when soon after it is suddenly and violently seized with spasms; all the limbs become rigid, the jaws are convulsively champed, and foam flows from the mouth; in a few minutes the creature begins to cry loudly and repeatedly, and to perform strange antics—jumping forward, and heedless of injury. The eye looks haggard and wild, and the respiration is hurried. The animal may die from the first or second attack—rarely it survives more than two: and if it does, it lies in a state of extreme lassitude for a long time; then it gradually regains its faculties, and in the course of some days is well again; but for some months it does not look thriving, and not infrequently there is a renewal of the attacks.

TREATMENT.—Little can be done for this disease in such young animals, beyond attention to the diet of both mother and off-spring, and if constipation is present it may be combatted by the means already mentioned. (See Constipation in Young Animals.)

SPASMS. (TETANUS AGNORUM.)

Spasms are frequently witnessed in Lambs, and sometimes is so prevalent that it is regarded as enzootic. It most frequently affects Lambs of the finer breeds, and usually during the first two or three weeks after birth.

CAUSES.—In many outbreaks, the Lambs are predisposed to the disease through the improper feeding and management of the Ewes.

SYMPTOMS.—The earliest symptoms are weakness, loss of vivacity, and diminished appetite; the limbs become stiff and the gait stilty, the back is arched, and the neck and legs undergo convulsive contortions, so that there is

difficulty in rising or walking. The cramps extend gradually to other parts of the body, until at last the animal cannot move, and to obtain food it has to be carried to the mother's teat, where it needs to be supported. Generally, if the animal does not receive attention, it will succumb in about eight or ten days. The fatal termination is sometimes preceded by grinding of the teeth, diarrhoea, convulsions and complete paralysis.

TREATMENT. — PRVENTIVE TREATMENT must be directed to keeping the Ewes in a healthy condition by proper feeding, and sheltering them from the weather if this be severe at lambing time. The Lambs should also be kept from cold winds and wet.

CURATIVE TREATMENT.—A dose of castor-oil should be given at the onset of the disease, and especially if there is any reason to apprehend that the meconium is retained in the intestines (see Constipation in Young Animals). Chlorodyne may be given in five drop doses every four hours in a little water. Friction should be applied to the limbs, either with or without whisky.

IMPERFORATE ANUS.

This condition is very serious unless surgical aid is quickly afforded, and even then the young creatures are not always saved.

This occlusion or imperforation may exist in various degree: There may be merely a membrane covering and occluding the anal opening; the borders of the anus may be adherent to a greater or less extent; the rectum may be more or less absent or incomplete; or it may open into the genito-urinary passages instead of the anus.

SYMPTOMS.—When no dung can be expelled, usually towards the second or third day after birth, uneasiness and symptoms of acute colic are manifested; the animal does not suck, the abdomen becomes distended,

expulsive efforts and pawing are observed, yet nothing passed. The animal shows signs of great pain and misery, and if help is not afforded it dies in agony.

TREATMENT.—If the obstruction is other than a simple membrane occluding the anus, but little can be done. But when this membrane, which is really the skin, projects like a large vesicle, owing to the pressure made upon it by the dung, is the obstacle, all that has to be done is to incise the mebrane both vertically and transverse; care being taken not to allow the knife to pass too deep. No sooner is this incision made than the meconium escapes; then the pointed ends of the membrane may be clipped off with a pair of sharp scissors. The index finger should be introduced as far as possible into the intestine, to make certain that all is right there. The lips of the wound should be lubricated by a little carbolized vaseline. Should the opening have a tendency to grow together, a tent may be introduced into the rectum, and withdrawn every now and again in order to allow the dung to be expelled.

IMPERFORATE VULVA.

This is frequently observed in new-born animals, and is serious, as the urine cannot escape unless it is expelled through the urachus by navel opening.

TREATMENT.—The lips of the vulva are to be separated vertically with a knife, using the same precautions, and after treatment as in imperforate anus (which see).

IMPERFORATE PREPUCE OF PENIS.

This is of unusual occurrence, but does sometimes occur in the Foal, causing an obstruction to the passage of urine, which is very serious.

TREATMENT.—An artificial opening is to be made in the prepuce, where the natural aperture should be; the

lips of the wound should be kept apart and the precautions and treatment the same as in Imperforate Anus (which see).

This operation is successful only when the urethral canal is open throughout its length; when it is occluded also, the operation will no longer be attended with benefit, and the operator must then endeavor to discover where the obstruction is, and either overcome it, or make an opening somewhere for the escape of the urine. The point of obstruction can be easily discovered by introducing into the penis a very small sound or catheter. On reaching the point of obstruction with the instrument, gentle force will usually overcome it. The catheter must be well oiled and allowed to remain in the canal of the penis for several days, to prevent the reuniting of the broken tissues.

OCCLUSION OF THE EYELIDS.

Occlusion of th eyelids has been witnessed in Foals, Calves, and other young animals. Of course, the following treatment is not to be applied in the natural occlusion of the eyelids of Puppies, Kittens, and young Rabbits. Accidental occlusion of the eyelids presents itself in two forms; in one, the margins of the upper and lower eyelids are only adherent; and in the other the eyelids are, in addition, adherent to the eye itself throughout the entire surface.

TREATMENT.—The first mentioned variety is alone curable, and in order to disunite the eyelids, the operator, after producing local insensibility by the application of cocaine, proceeds as follows: Securing the head of the creature in the hands of an assistant, the upper eyelid is elevated by another assistant by means of a pair of forceps. The operator himself seizes the lower lid with a forceps, and pulls it is far as possible from the eyeball beneath; then, taking a small, sharp pair of scissors in his right hand, a small puncture or notch is to be made between the margins of the eye-

lids, in such a manner as not to injure either lid, if possible, and much less to wound the eye. The scissors is now passed along to separate the lids as far as the inner corner of the eye, and then to the outer corner. All that is required after the operation, is to apply a very little lard to the borders of the lids, using care not to get any into the eye, as it might cause inflammation of that organ.

OCCLUSION OF THE EAR.

When this condition exists, deafness is the consequence, as well as dumbness. It is the dumb condition which most frequently attracts attention, and leads to the discovery that the real defect is deafness.

TREATMENT.—A small prominent tumor is detected in the place of the ear, or where the external auditory canal should be. This tumor is rather soft, and can be readily seized by forceps, when it may be punctured by a sharp-pointed knife, and a vertical, as well as a transverse, incision made through it. When the membrane is opened, a quantity of grey cerumen is found obstructing the canal; this can be extruded by pressure, injections of tepid water, or a small scoop. To prevent the closure to the canal, a little morsel of lint or fine tow is placed in the ear, and retained there by a bandage round the head.

If both ears are affected, one only should be operated upon at a time; and, as a rule, it is better to wait until the slight inflammation which follows the operation subsides, before the other ear undergoes the same treatment.

TONGUE-TIE.

The fraenum linguae is a triangular formed mucous membrane of the mouth, and situated between the lower part of that cavity and the lower surface of the tongue. When the fraenum is too narrow from above to below, or if it extends as far forward as the extremity of the ton-

gue, it cramps the tongue's movement, interferes with sucking and swallowing of fluids; the animal, if drinking out of a bucket, vainly plunges its face into the fluid as far as the eyes. The teat is seized with difficulty, and the tongue is so limited in its movements that it cannot be protruded to lick the nostrils. The defect is often unperceived, and the young creature loses condition, becomes weak, and eventually succumbs.

TREATMENT.—The treatment is very simple. It consists merely in dividing the fraenum to such an extent that the organ may recover its liberty of movement. Immediately after the operation, the creature protrudes its tongue to lick the blood which escapes from the incision; it can now drink with ease, and the wound will heal in a fewdays without any precautions.

TABLE OF ILLUSTRATIONS.

Fig.		Page.
1.	The Generative Organs of the Mare	7
2.	Section of Udder of Cow	12
3.	Generative Organs of the Mare: Isolated and Partly Opened	15
4.	Womb, Fallopian Tubes, and Horns of the Sheep	18
5.	Ovary Opened Vertically	23
6.	Portion of Ovary of a Pig	23
7.	Foetal Membranes of Cow at Mid-term. Womb opened on its left side	35
8.	Foetal Membranes of the Goat at Full Time: Twins	36
9.	Foetus of Mare and its Envelops	38
10.	Pregnant Womb of a Multiple-bearing and Single-bearing animal	41
11.	Twin Pregnancy: Cow	56
12.	Impregnating Tube	66
13.	Section of Impregnating Tube	66
14.	Dilator of Neck of the Womb	117
15.	Normal Position of the Foetus in the Mare at the First Stage of Parturition	118
16.	Normal Position of the Foetus in the Mare at the Second Stage of Parturition	120
17.	Normal Position of the Foetus in the Mare at the Third Stage of Parturition	122
18.	Posterior Position of the Foetus at the Third Stage of Normal Parturition	123
19.	Standing Position of the Cow, in the Act of Parturition	124
20.	Recumbent Position of the Mare, in the Act of Parturition.	125
21.	Diameters of the Pelvis	150
22.	Deviation of the Hind-limbs in the Anterior Presentation	154
23.	Fore-limbs Crossed over the Neck in the Anterior Presentation	156
24.	Fore-limbs Flexed at the Knees in the Anterior Presentation	157

Fig. Page.
25. Extending the Fore-limbs in the Anterior Presentation...158
26. Anterior Presentation: One Fore-limb Completely Retained 160
27. Anterior Presentation: Both Fore-limbs Completely Retained 161
28. Anterior Presentation: Downward Deviation of the Head.162
29. Anterior Presentation:Extreme Downward Deviation of the Head 163
30. Anterior Presentation: Lateral Deviation of the Head toward the Shoulder 165
31. Anterior Presentation: Lateral Deviation of the Head toward the Abdomen 166
32. Anterior Presentation: Deviation of the Head Upward and Backward 168
33. Posterior Presentation: Hock 170
34. Hock Presentation: Hock Corded 173
35. Thigh and Croup Presentation 174
36. Thigh and Croup Presentation:Thigh Corded.....176
37. Transverse Presentation 177
38. Transverse Presentation: Shoulder and Loin Presented..178
39. Transverse Presentation: Shoulder and Loin Presented..179
40. Transverse Presentation: Brest and Abdomen Presented, Head and Feet Engaged 180
41. Transverse Presentation: Breast and Abdomen Presented, Hind-limbs most advanced, Head retained 181
X. Womb Dilator 184
42-A. Traction Cord and Band, and the Manner of Applying Them 186
42-B. Traction Cord 186
43. Head Collar 188
44. Head Collar placed on Calf's Head, the right Fore-pastern being Corded also.....189
45. Wire Extractor 190
46. Wire-Extractor Applied 190
47. Tube and Noose 191
48. Noose Fixed on the Foetus 191
49. Darreau's Repeller, Armed with a Running Noose 192
50. Gunther's Curved Porte-Cord and Blunt Crotchet Armed with a Cord and Ring 192
51. Joint Repeller Closed 194
52. Joint Repeller Open 194
53. Short Blunt Crotchet or Hook 195
54. Blunt Finger Crotchet or Hook 195

55. Long Pointed Crotchet or Hook 196
56. Bitch Forceps 196
57. Obstetric Machine 202
58. Straight Embryotome 205
59. Curved Embroyotome 205
60. Spatula 206
61. Bone-Chisel 206
62. Bone Saw 206
63. Pad Pessary 224
64. Ring Pessary 225
65. Cup-and-Ball Pessary 226
66. Loop of Rope Truss which extends around the vulva....227
67. Rope Truss Applied 227
68. Leather Truss Applied 228
69. Ring Teat-Syphon 239
70. Perforating Sound 242
71. Truss Applied for Navel (Umbilical) Hernia 245
72. Navel (Umbilical) Clam 246

INDEX.

A. Page.

Abdominal explorations or examination 49
Abnormal rentention of the foetus 85
Abortion 90
Abortion, accidental 91
Abortion, epizootic or enzootic 105
Abortion, sporadic 91
Abortion, flooding (haemorrhage) after 219
Abortion, retention of the after-birth after 213
Absence of milk 240
Accidents of pregnancy 79
After-birth 36
After-birth, functions of 37
After-birth, retention of 213
After-pains 145
Agalactia, absence of milk 240
Amputation of the fore-limbs of the foetus 209
Amputation of the head of the foetus 207
Amputation of the hind-limbs of the foetus 210
Amputation of the limbs of the foetus 209
Angles of the vulva 7
Anus, imperforate 261
Arthritis 252
Artificial premature birth 212
Attention to the mother after normal parturition 143
Attention to the mother after difficult parturition 213
Attention to the mother during the first two stages of natural labour 129
Attention to the mother during the third stage of natural labour 134
Attention to the off-spring immediately after natural delivery has taken place 137
Attention to the off-spring after difficult parturition 213

B.

Page.
Bandages, trusses 223, 245
Bands 185
Barrenness 61
Barrenness in the female 63
Barrenness in the male 61
Birth, premature artificial 212
Bleeding (haemorrhage) from the womb before parturition... 85
Body of foetus, division of 211
Breast and abdominal presentation 179
Broad ligaments 19
Bulb, the 9

C.

Causes of death of foetus 133
Causes of parturition 114
Caution to the operator 137
Chest of foetus, reduction of 112
Colic during pregnancy 72
Constipation during pregnancy 71
Constipation in young animals 258
Contraction of the womb after normal parturition 147
Copulation 28
Cords, ropes, bands 185
Cornua 19
Cough during pregnancy 79
Cracks in the teats 241
Cramp during pregnancy 78
Crotchets 198
Crutch 193
Cup-and-ball pessary 225

D.

Death of foetus 132
Decapitation 207
Delivery, difficult 148
Delivery difficult, attention to the mother and off-spring after. 213
Delivery difficult, from malpresentations or malpositions of the foetus 153
Delivery difficult, how to make examinations in 148
Delivery difficult, retention of after-birth after 213
Delivery, disorders of the mother after 145
Delivery, flooding (haemorrhage) after 219

Page.
Delivery, duration of 126
Delivery, natural 113
Delivery natural, attention to the mother after 143
Delivery natural, attention to the off-spring after 137
Delivery natural, how to make examinations in (see examinations.)
Delivery natural, necessary aid in 128
Delivery natural, signs and course of 118
Delivery, position assumed during.....124
Detruncation 211
Development of ovaries and ova 25
Deviation of the head upwards and backwards 169
Deviation of the hind-limbs in the anterior presentation.....154
Division of the body of the foteus 211
Diarrhoea in young animals 256
Difficult labor, birth, parturition 148
Diseases incidental to pregnancy 69
Disorders of the mother after delivery 145
Downward deviation of the head, anterior presentation 162
Dropsical swelling around the navel (umbilical) cord 247
Dropsical swellings of the legs during pregnancy 72
Duration of delivery 126
Duration of pregnancy 52
Dysentery in young animals 256
Dystokia 148

E.

Ear, occlusion of 264
Eclampsia in young animals 260
Embryotomy 204
Embryotomy instruments 205
Embryotomy, preliminary arrangements for 206
Enzootic, Epizootic abortion 105
Examination, exploration abdominal 49
Examination, exploration rectal 51
Examination, exploration vaginal 52
Examinations, how to make successfully 49, 51, 52, 137, 148
Excessive amount of milk before parturition 79
Excessive waters (hydrops amnii) 73
External organs of generation 6
Extractor wire, for small animals 189
Eyelids, occlusion of 263

F.

Page.
Fall of vagina before parturition 79
Fall or inversion of the vagina after parturition 229
Fallopian tubes 21
Fallopian tubes, functions of 22
Fecundation 28, 33
Female generative organs 6
Fissures in the teats 241
Flooding (haemorrhage) after abortion 219
Flooding (haemorrhage) after delivery 219
Foetal membranes, retention of 213
Foetus, abnormal retention of 85
Foetus, cause of death of 133
Foetus, death of 132
Foetus, mal-presentation or Mal-position of 153
Foetus, traction of, or drawing on 134
Foetus, traction of in twin pregnancy 136
Foetuses twin, mal-presentations and positions of 183
Food for pregnant animals 58
Forced extraction of the foetus 199
Force employment of, in difficult parturition—traction 199
Forceps 197
Fore-limbs of foetus, amputation of 209
Fore-limbs completely retained, anterior presentation 159
Fore-limbs crossed over the neck, anterior presentation 155
Fore-limbs flexed at the knees, anterior presentation 157
Functions of the after-birth..... 37

G.

General care of the young after delivery 139
Generation 27
Generative organs, external 6
Generative organs, female 6
Generative organs, internal 14
Gestation 28, 39

H.

Halter 188
Head-collar 188
Head-cord 188
Head of foetus, amputation of 207
Head retained, and with it one or both of the fore-limbs.....169
Heat 30

Page.
Hind-limbs of foetus, amputation of 210
Hock presentation 170
Hooks 198
Horns of womb 19
How to make successful examinations in difficult parturition..148
Hurried (tumultuous) labour in normal parturition 130
Hygiene of pregnant animals 57

I.

Imperforate anus 261
Imperforate prepuce of penis 262
Imperforate vulva 262
Indigestion 254
Infectious abortion 105
Infecundity 61
Inflammation of the navel (umbilical) cord 248
Inflammation of the udder 238
Inflammation of the vagina 231
Inflammation of the womb (metritis) 233
Influence of pregnancy on ordinary diseases 68
Instruments, embryotomy 205
Instruments for the extraction of the foetus 184
Internal organs of generation 14
Inversion of the vagina 229
Inversion of the womb 220

J.

Joint disease 252
Joint-ill 252

L.

Labour, natural, normal 113
Labour natural, attention to the mother during the first two stages 129
Labour, difficult 148
Labour difficult, how to make examinations in....148
Labour, hurried (tumultuous) in normal parturition 130
Labour, natural, normal 113
Labour natural, attention to the mother during the first two stages of 129
Labour natural, attention to the mother during the third stage134
Labour natural, expelling powers 115
Labour natural, necessary aid in 128

Page.
Labour natural, signs and course of 118
Labour natural, signs and course of preliminary stage 118
Labour natural, signs and course of second stage 120
Labour natural, signs and course of third stage 121
Labour natural signs and course of the fourth stage 127
Labour, protracted 131
Lactation 146
Lateral deviation of head of foetus to right or left 165
Leather truss 228
Leucorrhoea 232
Limbs of foetus, amputation of 209
Lips of vulva 6
Liquor amnii 34
Lochia 145
Lochia, to prevent the untimely cessation of 146
Loss of apetite 70

M.

Malpresentations and malpositions of the foetus 153
Malpresentation of twin foetuses 183
Mammae 10
Material signs of pregnancy 47
Mechanical dilatation of the mouth of the womb 184
Mechanical means and instruments employed in the extraction of the foetus 184
Mechanical means for the retention of the womb after inversion 223
Meconium, retention of 258
Menstruation 30
Metritis 233
Milk, absence of 240
Milk duct, obliteration of 241
Milk, excessive amount of before parturition 79
Milk fever 146, 235
Miscarriage 90
Mother, attention to after difficult parturition 213
Mother, attention to after normal parturition 143
Mother, attention to during the first two stages of natural labor 129
Mother, attention to during the third stage of natural labour..134
Mother, attention to immediately after delivery 137
Mother, disorders of after delivery 145
Mouth of the womb 19
Multiple pregnancy 54

N.

Page.
Natural birth, delivery, labour, parturition 113
Natural measurements of the pelvis 150
Natural parturition, expelling powers 115
Natural presentation of foetus, anterior 153
Natural presentation of foetus, posterior 170
Navel cord, inflammation of 248
Navel, dropsical swelling around 247
Navel, rupture (hernia) of 244
Navel-string (umbilical cord) 39
Necessary aid in normal parturition 128
Noose and tube 191
Noose running, and manner of applying 186
Normal parturition 113

O.

Obliteration of the milk duct 241
Obstetrical physiology 27
Occlusion of the ear 264
Occlusion of the eyelids 263
Oedema of the umbilicus 247
Off-spring, attention to immediately after natural birth 137
Off-spring, attention to immediately after difficult birth 213
Omphalitis 248
Operator the, caution to 137
Ovaries, the 23
Ovaries and ova, development of 25
Oviducts 21
Ovum 24

P.

Pad pessary 223
Pains, after 145
Paralysis of the hind-quarters (paraplegia) 75
Parturient apoplexy 146, 235
Parturient fever 233
Parturition 28
Parturition, artificial premature 212
Parturition, difficult 148
Parturition difficult, attention to the mother after 213
Parturition difficult, attention to the off-spring after 213
Parturition difficult, flooding (haemorrhage) after 219
Parturition difficult, forced extraction in 199
Parturition difficult, how to make successful examinations in. 148

Page.
Parturition difficult, retention of the after-birth after.....213
Parturition difficult, twin foetuses in 183
Parturition, disorders of the mother after 145
Parturition, duration of 126
Parturition, fall or inversion of the vagina after 229
Parturition, inversion or prolapsus of the womb after 220
Parturition natural, normal 113
Parturition normal, attention to the mother after.....143
Parturition normal, attention to the mother during first two stages of 134
Parturition normal, attention to the off-spring immediately after 137
Parturition normal, expelling powers 115
Parturition normal, flooding (haemorrhage) after 219
Parturition normal, how to make examinations in 148
Parturition normal, hurried (tumultuous) labour during 130
Parturition normal, necessary aid in 128
Parturition normal, retention of the after-birth after 213
Parturition normal, signs and course of 118
Parturition normal, signs and course of preliminary stage....118
Parturition normal, signs and course of second stage 120
Parturition normal, signs and course of third stage 121
Parturition normal, signs and course of fourth stage 127
Parturition, position assumed during 124
Parturition, rupture of the womb after 230
Pass 192
Pathological disturbances incidental to pregnancy 68
Pathology of pregnancy 68
Pelvis, natural measurements of 150
Penis, imperforate prepuce of 262
Perinaeum, the 9
Perinaeum, rupture of 231
Persistance of the urachus 244
Pessary, cup-and-ball 225
Pessary, pad 223
Pessary, ring 224
Physiology, obstetrical 27
Pica, loss of appetite 70
Placenta 36
Position assumed during delivery 124
Position of foetuses in multiple pregnancy 55
Post partum haemorrhage 219
Porte-cord 192

Page.
Pregnancy 28, 39
Pregnancy, accidents of 79
Pregnancy, diseases incidental to 69
Pregnancy, dropsical swellings of the legs during 72
Pregnancy, duration of 52
Pregnancy, influence of on ordinary diseases 68
Pregnancy, material signs of 47
Pregnancy, multiple 54
Pregnancy multiple, position of foetuses in 55
Pregnancy, pathology of 68
Pregnancy, pathological disturbances incidental to 68
Pregnancy, rational signs of 45
Pregnancy, sensible signs of 49
Pregnancy, signs of 45
Pregnancy, twin 54
Pregnant animals, dwellings for 59
Pregnant animals, food for 58
Pregnant animals, hygiene of 57
Pregnant animals, tranquility of 60
Pregnant animals, water for 59
Preliminary arrangements for embryotomy 206
Presentation anterior, deviation of the head upward and backward 169
Presentation anterior, deviation of the hind-limbs 154
Presentation anterior, downward deviation of the head 162
Presentation anterior, fore-limbs completely retained 159
Presentation anterior, fore-limbs crossed over the neck 155
Presentation anterior, fore-limbs flexed at the knees 157
Presentation anterior, head retained and with it one or both of the fore-limbs 169
Presentation anterior, lateral deviation of the head to the right or left 165
Presentation anterior, natural 153
Presentation posterior, hock 170
Presentation posterior, natural 170
Presentation posterior, thigh and croup 174
Presentation, transverse 177
Presentation, transverse back, loin and shoulder presented ... 177
Presentation transverse, breast and adominal 179
Prolapsus of the vagina before parturition 79
Prolapsus of the womb after parturition 220
Protracted labour during the first two stages of normal parturition 131

Page.
Portrusion of the vagina before parturition 79
Puberity 28
Puncture of the cranium or skull of foetus 207

R.

Rational signs of pregnancy 45
Reduction of the abdomen of the foetus 212
Reduction of the chest of the foetus 212
Rectal examination or exploration 51
Repeller or crutch 193
Reproduction 27
Retention of the after-birth after abortion 213
Retention of the after-birth after parturition 213
Retention of the foetal membranes, or envelops.....213
Retention of the meconium 258
Rickets and softening of the bones 70
Ring pessary 224
Ropes—cords 185
Rope truss 226
Running noose and manner of applying 186
Rupture of the navel 244
Rupture of the perinaeum 231
Rupture of the vagina 230
Rupture of the water-bag 134
Rupture of the womb before parturition 83
Rupture of the womb before parturition 83
Rut 30

S.

Sensible signs of pregnancy 49
Signs and course of normal parturition 118
Signs and course of the preliminary stage of normal parturition 118
Signs and course of second stage of normal parturition 120
Signs and course of third stage of normal parturition 121
Signs and course of forth stage of normal parturition 127
Signs of pregnancy 45
Skull of foetus, puncture of 207
Softening of the bones 70
Spasms in young animals 260
Sporadic abortion 91
Sterility 61
Sterility in the female 63
Sterility in the male 61
Suspended animation in the new-born animal 138

Page.
Suspended life in the new-born animal.....138
Suspensory ligaments 19

T.

Teats, cracks and fissures in 241
Teats, obstruction of (obliteration of the milk duct) 241
Tetanus agnorum 260
Thigh and croup presentation 174
Tongue-tie 264
Traction cords, ropes, and bands 185, 186, 188
Traction—employment of force in parturition 199
Traction of, or drawing on the foetus 134
Traction of the foetus in twin pregnancy 136
Tranquility of pregnant animals 60
Transverse presentation 177
Truss, leather 228
Truss, rope 226
Tube and noose 191
Twin foetuses, malpresentation of 183
Twin pregnancy 54
Twin pregnancy, natural position of foetuses in 55
Twin pregnancy, traction of the foetus in 136

U.

Udder, the 10
Udder, functions of 14
Udder, inflammation of 238
Udder, modifications of at puberty and before parturition 11
Umbilical cord 39
Umbilical hernia 244
Umbilicus, inflammation of 248
Urachus, persistence of 244
Uterus 17
Utricular glands 19

V.

Vaginal examinations or explorations 52
Vagina, fall or inversion of after parturition 229
Vagina, inflammation of 231
Vagina, protrusion (prolapsus) of before parturition 79
Vagina, rupture of 230
Vagina, the 14
Vulva 6
Vulva, imperforate 262

W.

Water-bag, rupture of 134

Page.
Waters, excessive 73
Waters, the (liquor amnii) 34
Whites 232
Wire extractor for small animals 189
Womb, the 17
Womb, body of 18
Womb, cavity of 19
Womb, contraction of after delivery 147
Womb, bleeding (haemorrhage) from after parturition 219
Womb, bleeding (haemorrhage) from before parturition 85
Womb, inflammation of 233
Womb, inversion or prelapsus of after parturition 220
Womb, mouth of 19
Womb, rupture during and after parturition 230
Womb, rupture of before parturition 83

Y.

Young animal, attention to after difficult delivery 213
Young animal, attention to immediately after natural delivery. 137
Young animal, arthritis in the 252
Young animal, asphyxia of 243
Young animal, constipation in the 258
Young animal, death of, before delivery 132
Young animal, diarrhoea, dysentery in the 256
Young animal, diseases and abnormalities of the 243
Young animal, eclampsia in the 260
Young animal, imperforate anus in the 261
Young animal, imperforate prepuce of penis in the 262
Young animal, imperforate vulva in the 262
Young animal, indigestion in the 254
Young animal, joint disease, joint ill in the 252
Young animal, navel-bleeding (haemorrhage) from 243
Young animal, navel-dropsical swelling around 247
Young animal, navel flow of urine from 244
Young animal, navel-inflammation of 248
Young animal, navel-rupture, hernia of 244
Young animal, navel-string of the 39
Young animal, occlusion of the ear 264
Young animal, occlusion of the eyelids of the 263
Young animal, retention of the meconium in the 258
Young animal, spasms in the 258
Young animal, suffocation of the 243
Young animal, suspended life—suspended animation in the .. 138
Young animal, tongue-tie in the 264

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